

Part 2. Compilation of national input-output tables

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Part 2

Compilation of national I-O tables

Reports from project member countries

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CHINA

Zhang Yaxiong, Zhao Kun
Department of Economic Forecasting
State Information Center

1. INTRODUCTION

1.1 Brief history of the national I-O table

Input-output analysis was introduced to China in the 1960s. In 1974 the first physical I-O table of China for 1973 was compiled. This table included 61 products. In 1982 the first monetary I-O table, with 26 intermediate sectors, and a physical I-O table, with 146 products, for 1981 were compiled (see Table 1). In 1984 the updated monetary I-O table, with 22 intermediate sectors, for 1983 was compiled, based on the 1981 table. The five agricultural sectors in the 1981 table were aggregated into one sector, and the other sectors were as same with the 1981 table. All of those tables were on the basis of the MPS (Material Product System).

Table 1: Input-output table of China

Year	Physical I-O table	Monetary I-O table
1973	√ (61 products)	
1981	√ (146 products)	√ (26 sectors)
1983		√ (22 sectors)
1987		√ (117 sectors)
1990		√ (33 sectors, updated table)
1992	√ (151 products)	√ (118 sectors)
1995		√ (33 sectors, updated table)
1997		√ (124 sectors)
2000		√ (17 sectors, updated table)

In March 1988, in order to meet the needs for reform and opening-up and the macro-level policy making, a government policy of compiling an I-O table every five years was drawn up. In the same year, the first special survey on input-output was carried out for the 1987 monetary I-O table, with 117 sectors. This table was published

in 1991. Unlike the previous tables, it was based on the SNA (Systems of National Accounts). After that, for 1990, 1992, 1995, and 1997 monetary tables and a 1992 physical table were compiled. The tables for 1990 and 1995 were updated ones. There were 118 sectors in the 1992 monetary table, 151 products in 1992 physical table, and 124 sectors in 1997 monetary table. Currently, the updated table for 2000, at a 17-sector level, was published in the *China Statistical Yearbook (2003)*, but the detailed one for 2000 and the benchmark table for 2002 are still being constructed.

1.2 Features of the national I-O table

The 1997 national I-O table is a noncompetitive import-type table. There are three quadrants: intermediate input (demand), final demand, and value added. The structure is as follows:

Table 2: I-O table of China, 1997

(At current producer's price)

10 thousand RMB

OUTPUT INPUT		Intermediate demand			Final demand										Imports	Errors	Gross output
		Grain crop cultivation	...	Public administration and other sectors	Total intermediate use	Final consumption				Gross capital formation			Exports	Total final use			
						Household consumption		Government	Subtotal	Gross fixed capital formation	Change in inventories	Subtotal					
						Rural	Urban											Sub-total
Intermediate inputs	Grain crop cultivation	I			II												
	...																
	Construction																
	...																
	Public administration and other sectors																
	Total intermediate inputs																
Value added	Depreciation of fixed capital	III															
	Compensation of employees																
	Net taxes on production																
	Operating surplus																
	Total value added																
Total inputs																	

1.2.1 Intermediate input (demand)

China's 1997 I-O table adopted new classification based on Industrial Classification and Codes of the National Economy GB/T4754-9. In the table, there are 124 intermediate sectors, 6 sectors more than in the 1992 table. Specifically, there are 5 sectors for agriculture, 8 for mining, 72 for manufacturing, 5 for electric, gas, and water supply and construction, 10 sectors for transport, 1 for warehousing, 2 for telecommunication, 2 for trade and restaurants, and 19 sectors in other services.

But the 2000 national updated I-O table only has 17 intermediate sectors: (1) Agriculture; (2) Mining and Quarrying; (3) Foodstuffs; (4) Textiles, Sewing, Leather, and Fur products; (5) Other Manufacturing; (6) Production and Supply of Electric Power, Steam, and Hot water; (7) Coke, Gas, and Petroleum Refining; (8) Chemical Industry; (9) Building Materials and Nonmetal Mineral Products; (10) Metal Products; (11) Machinery and Equipment; (12) Construction; (13) Transportation, Posts, and Telecommunications; (14) Commerce and Catering Trade; (15) Public Utilities and Resident Services; (16) Banking and Insurance; and (17) Other Services.

1.2.2 Final demand

Final demand is divided into 7 items in the 1997 table: (1) Rural Inhabitant Consumption, (2) Urban Inhabitant Consumption, (3) Government Consumption, (4) Gross Fixed Capital Formation, (5) Change in Inventories, (6) Exports, and (7) Imports (less). Unlike the previous I-O tables, the 1997 table listed export and import separately, thus supplying more detailed information for research and analysis on foreign trade and international economic interdependency. So does the 2000 updated I-O table.

1.2.3 Value added

Value added was newly created value from a production process and the transferred value of fixed goods. It includes four items: (1) Depreciation of Fixed Capital, (2) Compensation of Employees, (3) Net Taxes on Production, and (4) Operating Surplus.

2. ESTIMATION WORK

For 2000 a 40-sector updated national I-O table should have been compiled. However, up to now, there was only a 17-sector I-O table for 2000 published in the statistical

yearbook. Under this situation, it was more difficult to update the national I-O to conform to the AIO sector classification for the ISAP project.

For the ISAP project, we first made code concordance between the China I-O sector classification (CIO, which was grounded in the 124-sector classification of 1997) and the AIO sector classification (76 sectors). As simply aggregating some CIO sectors could not satisfy the requirements of AIO sector classification, some sectors in the CIO had to be disaggregated in order to make them consistent with the AIO. Hence, the updating of China's national I-O was in 142-sector classification.

Second, with the data for some related sectors having been estimated by National Bureau Statistics (NBS) and nominal annual growth rates of corresponding items, 124-sector CT, final demand, value added, and intermediate transactions for 1997 have been updated to the year 2000 at the 142-sector level. With the 17-sector CIO table for 2000 as the control, the modified RAS method has been applied to estimate value added and intermediate transactions. In this way, we compiled the 2000 updated CIO at the 142-sector level, aggregated it to the 79-sector level, and then made further adjustments to bring it to the 76-sector level.

The third step was the compilation of an import matrix and a noncompetitive import type of CIO table. Depending on the treatment of imports, the national I-O table can be classified into two types: the competitive import type and the noncompetitive import type. Since the CIO table for AIO compilation had to be a noncompetitive one, and our updated CIO table was of competitive type, we had to remove imports and related taxes from intermediate transactions and final demand from the updated competitive import type CIO table. Here, in order to compile a commodity import matrix of China, we set up another code concordance between AIO sector classification and China's harmonized commodity description and coding system classification (8-digit HS code) with the commodity import data by country of origin from the Customs Office of China and summed the data into the AIO 76-sector level. Accordingly, the tariff rates and import commodity tax rates by sector were estimated.

Finally, the import matrix, as well as the tariffs and import commodity taxes, were deducted from the intermediate transactions and final demand at the AIO 76-sector level to obtain the noncompetitive import type, intermediate transactions, and final demand. With all of them (intermediate transactions, final demand, import matrix,

tariffs and import commodity taxes, value added, and CT), the noncompetitive import type of CIO for the ISAP project was updated. The format is shown in Table 3, in which, matrix A^{CC} and F^{CC} show the domestic input and final demand, respectively, while the import intermediate demand is shown from matrix A^{IC} to A^{WC} , and the import final demand is shown from matrix F^{IC} to F^{WC} . Here, the letters I, M, P, S, T, N, K, J, U, H, O, and W stand for Indonesia, Malaysia, Philippines, Singapore, Thailand, Taiwan, Korea, Japan, U.S.A., Hong Kong, EU15, and Rest of the World, respectively. Similarly, the exports to these countries and the rest of the world are shown from column vector L^{IC} to L^{WC} . At the request of the ISAP project, we removed import duties from the import data and put them into a standalone row-vector DT. The tariffs of each country are listed from column vector DT^I to DT^W .

Table 3: Format of noncompetitive I-O table of China for AIO

	Intermediate Demand	Final Demand	DT	Exports												QX	XX
				I	M	P	S	T	N	K	J	U	H	O	W		
				L ^{CI}	L ^{CM}	L ^{CP}	L ^{CS}	L ^{CT}	L ^{CN}	L ^{CK}	L ^{CJ}	L ^{CU}	L ^{CH}	L ^{CO}	L ^{CW}		
Intermediate Input	Domestic	A ^{CC}	F ^{CC}	--													
	I	A ^{IC}	F ^{IC}	DT ^I													
	M	A ^{MC}	F ^{MC}	DT ^M													
	P	A ^{PC}	F ^{PC}	DT ^P													
	S	A ^{SC}	F ^{SC}	DT ^S													
	T	A ^{TC}	F ^{TC}	DT ^T													
	N	A ^{NC}	F ^{NC}	DT ^N													
	K	A ^{KC}	F ^{KC}	DT ^K													
	J	A ^{JC}	F ^{JC}	DT ^J													
	U	A ^{UC}	F ^{UC}	DT ^U													
	H	A ^{HC}	F ^{HC}	DT ^H													
	O	A ^{OC}	F ^{OC}	DT ^O													
	W	A ^{WC}	F ^{WC}	DT ^W													
VV		DT															
XX																	

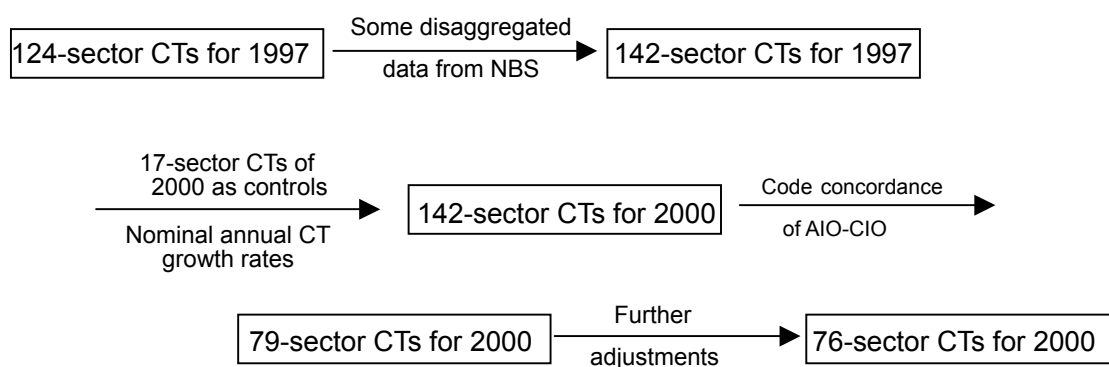
Note: I, M, P, S, T, N, K, J, U, H, O, and W stand for Indonesia, Malaysia, Philippines, Singapore, Thailand, Taiwan, Korea, Japan, U.S.A., Hong Kong, EU15, and Rest of the World, respectively.

2.1 Control Totals (CT)

The CTs in the 17-sector updated I-O table for 2000 published in the statistical yearbook were the controls for estimation. First, according to the code concordance between CIO and AIO sector classification (see 4.CODE CONCORDANCE), the 124-sector CTs for 1997 were disaggregated to the 142-sector level based on some disaggregated data from NBS. For instance, 5 agricultural sectors (Crop cultivation, Forestry, Livestock and livestock products, Fisheries, and Other agricultural products) were disaggregated into 13 sectors: Crop cultivation (rice), Crop cultivation (other grain), Other agricultural products, Crop cultivation (food crops), Other agricultural products (food crops), Crop cultivation (Nonfood crops), Other agricultural products (Nonfood crops), Livestock, and livestock products, Other agricultural products (Livestock), Forestry, Other agricultural products (Forestry), Fisheries, and Other agricultural products (Rural industry). Second, multiplied by the corresponding agricultural sectors' nominal annual total output growth rates estimated from related statistics (e.g. *Statistical Yearbook*, *Industry Statistical Yearbook*, etc.), the 13 agricultural sectors' CTs for 1997 have been updated for 2000, while the CTs for the agricultural sectors in the 17-sector table for 2000 were the controls. The same procedures were applied for the other sectors for the CT estimation.

Therefore, we got the 142-sector CTs for 2000. Then we aggregated them into the 79-sector level (the Rural industry, Machinery repair, and Scrap and waste sectors needed to be adjusted further. See 3.RELATED DATA and 4.CODE CONCORDANCE). Figure 1 shows the CT estimation procedures.

Figure 1: Flowchart of CT estimation



2.2 Final Demand

As with CT estimation, we only had 17-sector final demand data in the 2000 table; therefore, we also had to disaggregate the 17-sector data to the 142-sector level with a similar method for CT estimation. However, final demand consists of five items: (1) Private consumption, (2) Government consumption, (3) Gross domestic fixed capital formation, (4) Increase in stock, and (4) Exports. The first three we estimated from I-O data (the export data are from the Customs statistics), and Increase in stock is considered a discrepant item. Therefore, we were able to estimate the five items by sector, as shown in Figure 2.

2.2.1 Final demand estimation (excluding external trade)

Private consumption, Government consumption, Gross domestic fixed capital formation, and Total final demand for 2000 at the 142-sector level were updated based on the corresponding final-demand items for 1997 at the 124-sector level and their nominal annual growth rates, as well as some disaggregated data from NBS, while the 2000 final-demand data in the 17-sector table were used as controls. Then they were aggregated to the 79-sector level.

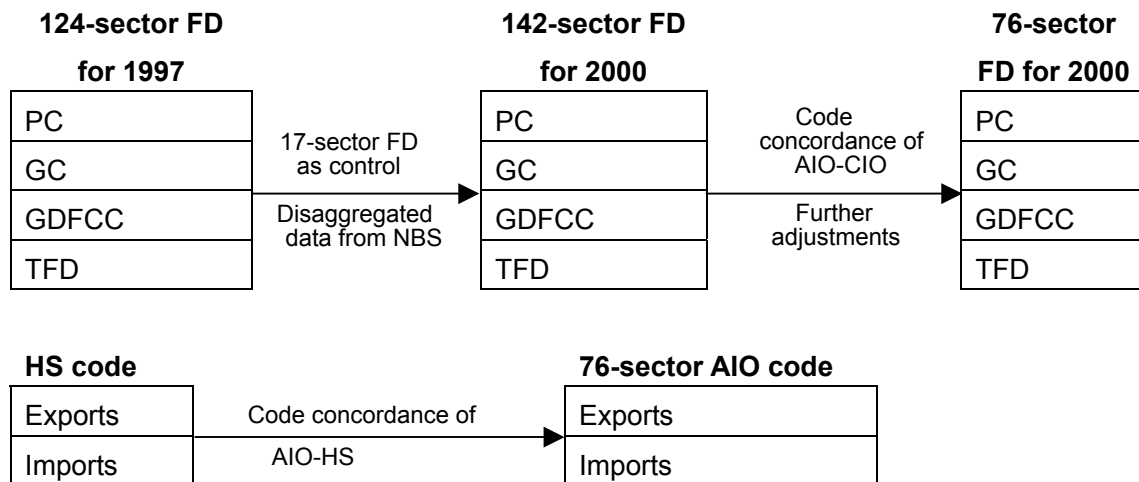
2.2.2 Export and import estimation

The commodity export and import vectors were estimated based on the data from Customs in 8-digit HS code classification. In the Customs data, exports were evaluated at FOB prices and imports at CIF prices. We set up code concordance between China's Harmonized Commodity Description and Coding System Classification (8-digit HS code) and the 2000 AIO sector classification. Based on this code concordance, the export and import statistical data were aggregated into export and import vectors at the 76-sector level.

For exports and imports of the service sector, the data in the 17-sector 2000 CIO were the overall controls, while the disaggregated sectors' export and import structures were referenced according to the 124-sector 1997 CIO by NBS. At the same time, some adjustment was made according to the corresponding statistics. There are 34 service sectors in 1997 CIO table, most of which have exports; however, only the following 16 have imports: (1) Posts, (2) Telecommunication, (3) Eating and drinking places, (4) Railway passenger transportation, (5) Highway passenger transportation, (6) Water passenger transportation, (7) Air passenger transportation, (8) Finance, (9) Insurance,

(10) Public services, (11) Hotels, (12) Tourism, (13) Other social services, (14) Health services, (15) Culture and arts, radio, film and television, and (16) Public administration.

Figure 2: Flowchart of FD (final demand) estimation



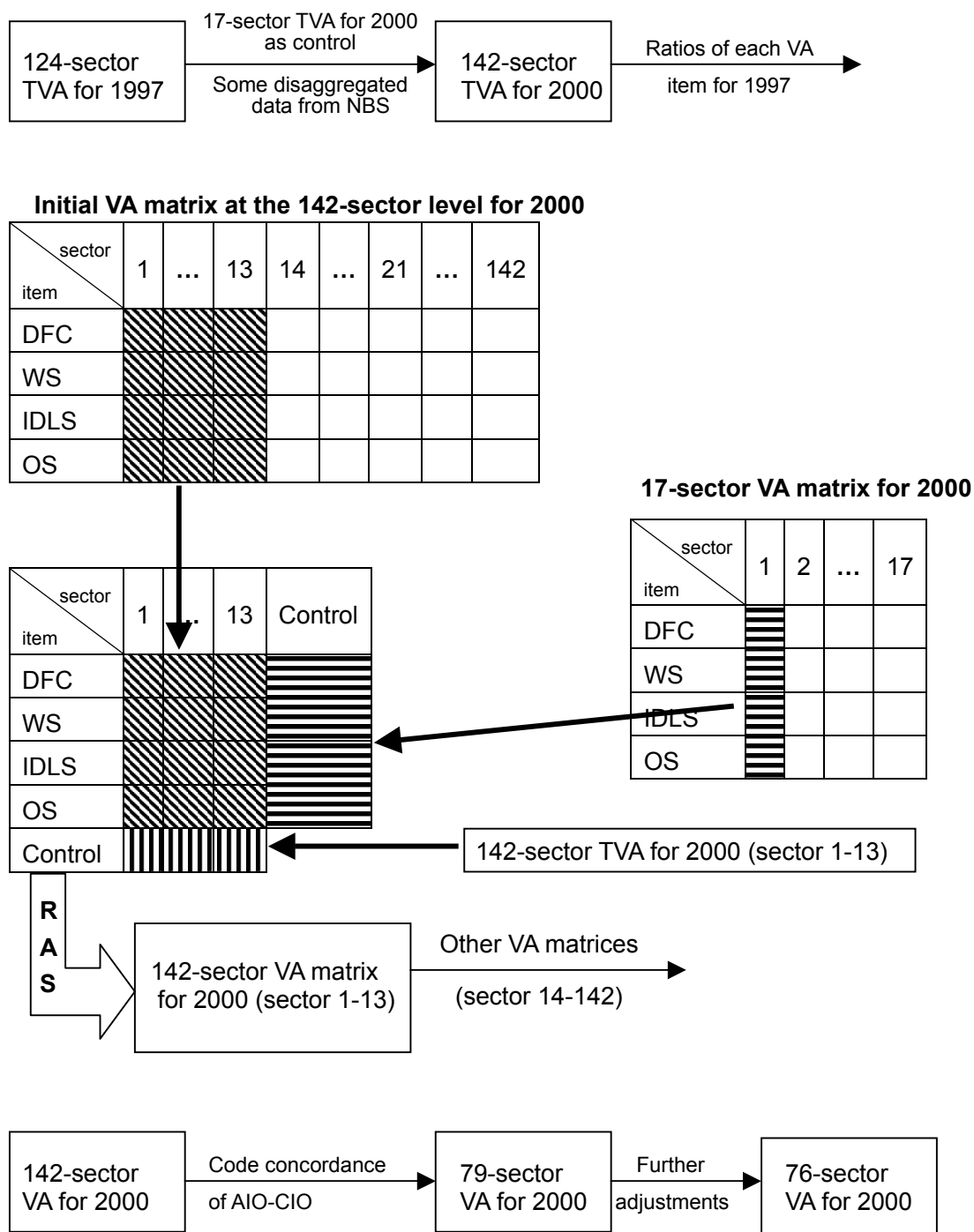
Increase in stock = TFD-PC-GC-GDFCC-Exports

Note: PC, GC, GDFCC, and TFD stand for private consumption, government consumption, gross domestic fixed capital formation, and total final demand, respectively.

2.3 Value Added

The estimation procedure for value added is also similar to that for CT and final demand, but the modified RAS method was applied here to balance the estimation. The estimation process is shown in Figure 3.

Figure 3: Flowchart of VA (value-added) estimation



Note: TVA, DFC, WS, IDLS and OS stand for total value added, depreciation of fixed capital, wages and salary, indirect taxes less subsidies, and operating surplus respectively.

First, the total 142-sector value added for 1997 was updated to 2000 based on the nominal annual growth rates of corresponding sectors and some disaggregated data from NBS, with overall 17-sector value-added data as controls. At the same time, the ratio of each value-added item (including depreciation of fixed capital, wages and salary, indirect taxes less subsidies, and operating surplus) in total value added for 1997 was calculated.

Second, we multiplied the ratio of each value-added item by the estimated total 142-sector value added for 2000 and got the initial value-added matrix for 2000 at the 142-sector level. Here, the ratios in the sectors at the 142-sector level, which were disaggregated from the corresponding sector in 124-sector classification, are the same. For instance, the Crop cultivation sector in 124-sector classification was disaggregated into 4 sectors at the 142-sector level; therefore, the ratio of each value-added item in total value added in these 4 sectors is same as the corresponding ratio of the Crop cultivation sector at the 124-sector level.

Third, the RAS method was applied to estimate the value-added items of each sector at the 142-sector level, with the 17-sector value added for 2000 as the corresponding control. For example, in the 17-sector classification, there is only one agricultural sector, but in the 142-sector classification, it was disaggregated into 13 sectors. After the estimation of total value added and initial value-added matrix, the 13 agricultural sectors' total value added was the column control, and agriculture value added vector from the 17-sector valued added matrix of 2000 was the row control. The RAS method was used to estimate the value-added matrix for the 13 agricultural sectors for 2000. The same procedure was applied to other sectors, also. Then we able to have the value-added items of each sector added at the 142-sector level. Finally, the estimation result was aggregated to the 79-sector level

2.4 Intermediate Transaction

Intermediate transaction estimation is the basic work of updating national I-O. As with CT, final demand and value added estimation, the 17-sector intermediate transactions for 2000 and the structure of 124-sector intermediate transactions for 1997 were the starting points of this work (Figure 4 shows the estimation process in detail).

2.4.1 Estimation of freezing-cell matrices and the initial intermediate transaction matrix

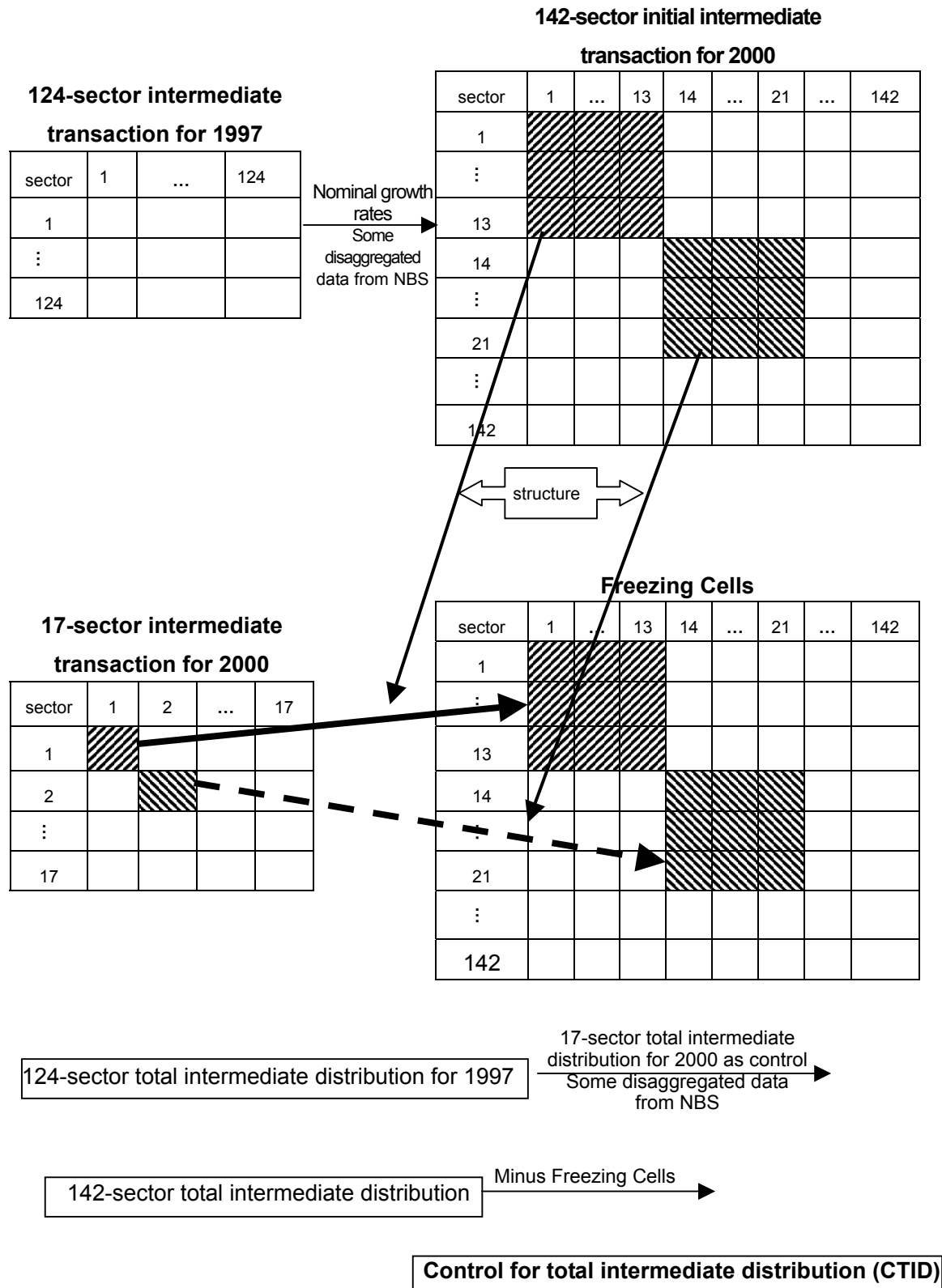
Based on nominal growth rates of corresponding items and some disaggregated data from NBS, the 124-sector intermediate transactions for 1997 were updated to 2000 at the 142-sector level. The diagonal values of 17-sector intermediate transactions for 2000 were disaggregated into corresponding matrices according to the updated structure of the corresponding sectors' intermediated transactions at the 142-sector level. For instance, as mentioned before, the agricultural sectors in the 17-sector classification were disaggregated into 13 sectors; therefore, the input (demand) from an agricultural sector to an agricultural sector was disaggregated into a matrix with 13 rows and 13 columns. Here, the estimated diagonal matrices were considered freezing cells, and the other values from 142-sector intermediate transactions were the initial intermediate transactions for the RAS procedure.

2.4.2 RAS procedure

The modified RAS method was adopted to adjust the initial intermediate transaction matrix in order to account for the changes in the production and demand structures from 1997 to 2000. The controls for total intermediate distribution were estimated from 124-sector data for 1997, based on some disaggregated data from NBS, while the corresponding items of the 17-sector 2000 table served as controls. Here, the freezing-cell values had to be subtracted from the results. At the same time, the controls for total intermediate input were equal to the corresponding sectors CT minus total value added and the sum of corresponding freezing-cells value at the 142-sector level.

After the RAS procedure, we obtained the 142-sector intermediate transaction matrix for 2000 then aggregated to the 79-sector level.

Figure 4: Flowchart of intermediate transaction estimation

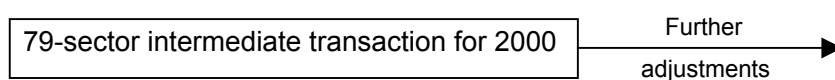
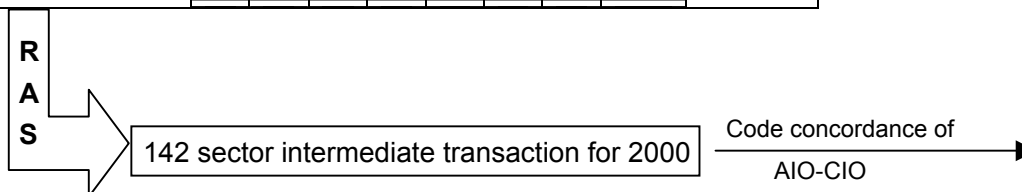


Control for total intermediate input (CTII)

=142-sector CT for 2000 – 142-sector VA for 2000 – Freezing cells

Initial matrix

Sector	1	...	13	14	...	21	...	142	CTID
1	0	0	0						
⋮	0	0	0						
13	0	0	0						
14				0	0	0			
⋮				0	0	0			
21				0	0	0			
⋮							0		
142								0	
CTII									



76-sector intermediate transaction for 2000

2.5 Import Matrix

For compilation of the import matrix, a special survey on the distribution for 2000 of imported commodities in China was conducted. At the same time, we performed some analyses and discussed this within the SIC I-O project team and also consulted domestic and IDE experts regarding distribution of imported commodities. We also referenced the 1995 import matrix to make the final adjustments.

2.5.1 Estimation methodology

A special survey was conducted on the distribution of imported commodities for the compilation of the commodity import matrix. Those commodities included grain, meat, cooking oil, and other food and beverages, as well as chemical products, iron, steel, and other metallic products, electronic products, etc. The survey focus on 510 state-owned key enterprises and 100 enterprise groups (because of the overlap, there were 549 state-owned key enterprises and enterprise groups in total), which was helpful in carrying out the survey, provided easy control, and also made it representative and comprehensive. In spite of this, the survey was limited, since some commodities and sectors were not included. Therefore, we had to reference the results of the commodity import matrix of the 1995 table, perform analyses, discuss the matter within the SIC I-O project team, and consult domestic and IDE experts.

Based on the survey results, we compiled an import distribution coefficient matrix, which rowwise shows the distributive ratio to each intermediate sector or final demand for each AIO sector. With the distribution coefficient matrix multiplied by import vector already estimated rowwise, the primary commodity import matrix by AIO sector was compiled. Then, the comparison work of the primary import matrix to the intermediate transactions in the initial 76-sector CIO table had to be done, and adjustment for the final import matrix was also necessary.

It should be noted that our survey was based on the sector classification of the China Standard Industry Classification (CSIC, GB/T 4754-94). Before we aggregated the survey results, we had to compile code concordance among the CSIC, CIO, and AIO sector classification then sum the data according to AIO sectors. In addition, the import data from the Custom's Office were evaluated at CIF; therefore, we did not need to perform conversion of import evaluation.

2.5.2 Division of the import matrix, by country of origin

At the request of the ISAP project, the import matrix had to be divided by country and region. With the import distribution coefficient matrix and import data in 8-digit HS code for each country and region, we compiled the commodity import matrix for 12 countries and regions. The service imports and direct purchases were treated as imports from the Rest of the World.

In the ISAP project, the countries and regions in import matrices include Indonesia,

Malaysia, the Philippines, Singapore, Thailand, Taiwan, South Korea, Japan, the United States, Hong Kong, EU15 (France, Germany, Italy, the Netherlands, Belgium, Luxemburg, the United kingdom, Denmark, Ireland, Greece, Spain, Portugal, Austria, Sweden, and Finland), and R.O.W. (Rest of the World).

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

The data on domestic trade and transportation margins by CIO sector were obtained from the NBS. Then they were aggregated and processed to trade-margin rates and transportation margins by AIO sector.

3.2 Import duties and import commodity taxes

We calculated the tariffs and import commodity taxes by commodity, using the import duty rate, import commodity tax rate, and the value of imports at the 8-digit HS code level. Then they were aggregated into the values of duties and import commodity taxes by AIO classification, based on the code concordance between AIO and 8-digit HS code classification. Thus, we were able to calculate the rates of duties and import commodity taxes by AIO sector.

3.3 International freight and insurance

As with the import duty and commodity tax estimation, we applied the international freight and insurance rate to the values of imports by 8-digit HS code and got the values for international freight and insurance by commodity. Then they were aggregated by AIO classification, based on the code concordance between AIO and 8-digit HS code classification. Then the rates of international freight and insurance by AIO sector were calculated.

3.4 Employment matrix

At the request of IDE, we needed to compile China's employment matrix by AIO sector. In China's statistics there are two sources of employment data for 2000. One is the

China Labor Statistical Yearbook 2001, and the other is *China 2000 Population Census Data*. Since the all the employment data in the former statistics were consistent with those submitted to the International Labor Organization (ILO) by the Chinese government, yet there was more detailed information by sector in the latter, we decided to adopt the overall Employment data from the *China Labor Statistical Yearbook* and the employment structure by sector from *China 2000 Population Census Data*.

3.4.1 Classification of employment in China

Based on discussions with the I-O team at IDE, we believed that we could not compile the employment matrix by classification of employee, own-account worker, and unpaid family worker according to the current primary data in China's labor statistics. All we could do was compile the sectoral employment by city, town, and rural area.

According to the "Stipulations on Rural-Urban Statistical Classification (Trial)" in *China 2000 Population Census Data*, China's geographic areas are divided into urban and rural, in which the urban population is composed of city and town populations. Here, "city" refers to any municipality authorized by the State Council, including all the lower-level branches within it. To be precise, any city district with an average population density of at least 1,500 persons per sq. km. is automatically counted as urban, and its entire population is counted as city population. For a city district with density below 1,500 per sq. km., or a county-level city, only the population in a township-level unit (street, town and township) where the district or city government is located and the built-up area is contiguous to it and all other streets is defined as city population. For a city without designated districts, the population in a township-level unit where the government is located and the built-up area is contiguous to it is classified as city population.

"Town" refers to a township area authorized by the State Council. The population in that area, where the town government and the residents' committee affiliated to it are located, and the built-up area contiguous to it, is counted as town population. A rural area is an area other than a city or town.

3.4.2 Compilation of the employment matrix

The employment data in the population census were classified at the 92-sector level under the China Standard Industry Classification (CSIC, GB/T 4754-94). Since the overall employment data from labor statistics are consistent with ILO, and the data

from the population census provides a wealth of detailed information, we used the overall employment data from the former and the employment structure by sector from the latter. There exists an “Others” sector in the employment statistics, and we first put all of the discrepancies into this sector then distributed them among the 76 AIO sectors according to the employment structure.

First, code concordance was compiled between the CSIC and CIO sector classifications. Second, the employment data by CSIC sector were collated and aggregated based on the CSIC-CIO-AIO code concordance. If one CSIC sector related to several AIO sectors, it was disaggregated according to the corresponding CT structures of AIO sectors before aggregation. Finally, the discrepancies were distributed among the sectors.

3.5 Others: Adjustment of the scrap and waste sector

In the CIO sector classification, there was a standalone scrap and waste sector, which had to be adjusted. There were no inputs except operating surplus columnwise. We assumed that the operating surplus of scrap and waste was generated from the sectors that had more scrap input. Then we disaggregated the operating surplus of the scrap and waste sector to the sectors according to the corresponding intermediate distribution structure of the scrap and waste sector. The row vector disaggregation is based on the structure of the changed CT.

As shown in Figure 5, the column vector for the scrap and waste sector in the CIO only has operating surplus (assumed to be 100), while in the uses of scrap and waste sector, we assumed that there was only intermediate use in two industrial sectors, which were 60 and 40, and no data for agricultural sectors, service sectors, or final demand. First, we distributed the operating surplus (OS) only into the industrial sectors of Industry 1 and Industry 2 according to their use structures, and the OS of Industry 1 and 2 increase 60 and 40, respectively, which led to rises in corresponding CTs (+60, +40). Then the row vector for the scrap and waste sector was distributed into the two industrial sectors according to the changed CT separately, and Industry 1’s inputs from Industry 1 and Industry 2 increased by 36 and 24, respectively, while Industry 2’s inputs from Industry 1 and Industry 2 increased by 24 and 16, respectively. Thus, the scrap and waste sector was disaggregated and added into other sectors.

Figure 5: Adjustment of the scrap and waste sector

Original I-O table

	Agriculture	Industry 1	Industry 2	SW	Service	Final Demand	Total Output
Agriculture				0			
Industry 1				0			
Industry 2				0			
SW	0	60	40	0	0	0	100
Service				0			
OS				100			
Total Input				100			

SW: scrap and waste sector, OS: operating surplus.

Assumption: Operating surplus for scrap and waste is generated from sectors that have more scrap input.

1. Operating surplus distributed into sectors with input from the scrap & waste sector

	Agriculture	Industry 1	Industry 2	Service	Final Demand	Total Output	SW
Agriculture							0
Industry 1							0
Industry 2							0
SW							0
Service							0
OS		+60 ▲	+40 ▲				100|
ΔCT		+60	+40				

2. Row vectors of the scrap & waste sector distributed into sectors according to change in CT

	Agriculture	Industry 1	Industry 2	Service	Final Demand	ΔCT
Agriculture						
Industry 1		▶+36	+24			+60
Industry 2		▶+24	+16			+40
Service						

SW	0	←60	40	0	0
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4. CODE CONCORDANCE

4.1 Sector classification

There are 76 sectors in the 2000 AIO classification but 124 sectors in the 1997 CIO classification. Therefore, we made code concordance between AIO and CIO sector classification. Before we could use this code concordance, some CIO sectors had to be aggregated into one sector, while some had to be disaggregated further (listed in Table 3). In this case, there are 142 sectors in the new CIO classification. After updating, the national I-O table was aggregated into a 79-sector table.

Table 4: Disaggregation sectors in CIO

CIO code	Description of the sector	Disaggregation
0101001	Crop cultivation	<A> Rice
		 Other grain
		<C> Food crops
		<D> Nonfood crops
0101005	Other agriculture products	<A> Other grain
		 Food Crops
		<C> Nonfood crops
		<D> Livestock
		<E> Forestry
		<F> Rural industry
0613014	Grain mill products, vegetable oil and forage	<A> Milled grain
		 Vegetable oil and forage
0717022	Cotton textiles	<A> Spinning
		 Weaving and dyeing
0717023	Woolen textiles	<A> Spinning
		 Weaving and dyeing
0717024	Hemp textiles	<A> Spinning
		 Weaving and dyeing
0717025	Silk textiles	<A> Spinning
		 Weaving and dyeing
0717027	Other textiles	<A> Spinning
		 Weaving and dyeing
0818028	Wearing apparel	<A> Wearing apparel
		 Other fiber
1229046	Rubber products	<A> Tires and tubes
		 Other rubber products
1737072	Other transport machinery	<A> Motorcycles
		 Other transport machinery
2749090	Construction	<A> Building construction
		 Other construction

4.2 Adjusting rural industry

As shown in Table 4, the other agricultural products sectors in the 124-sector classification were disaggregated into 6 parts, one of which was rural industry. However, there was no corresponding sector in the AIO classification; therefore, we needed to adjust rural industry into other sectors. We first investigated which sectors in the AIO sector classification contained the activities of China's rural industry. The sectors are listed in Table 5. Then, we distributed row and column vectors for rural industry according to CT structures at the level of AIO sector classification for the corresponding manufacturing sectors.

Table 5: Industrial sectors in AIO sector classification related to rural industry

	AIO sectors
Rural industry	12. Milled grain and flour
	13. Fish products
	14. Slaughtering and meat products
	15. Other food products
	16. Beverage
	17. Tobacco
	18. Spinning
	19. Weaving and dyeing
	23. Leather and leather products
	40. Other nonmetallic mineral products
	43. Metal products
	60. Other manufactured products

Figure 6 shows the adjustment procedure for rural industry. We assume rural industry's inputs to be from Agriculture, Rural crafts, Food, and Textiles, Other industry and Services sectors are 10, 10, 20, 20, 20, and 10, and the value added and CT for the rural sector are 10 and 100. The distribution of the Rural sector in those sectors is 10, 10, 20, 20, 10, and 10, and the final demand and CT of the Rural sector are 20 and 100, respectively. First, the row vector of the rural sector was distributed into related sectors (including Food, Textiles, and Other industrial sectors) columnwise according to their CT structure. This treatment resulted in increases in the CTs of the Food, Textiles, and

Other industrial sectors (+40, +40, and +20). Then, the column vector of the rural sector was distributed rowwise according to the changed CTs of these related sectors. Thus, the Rural sector was adjusted and distributed into other sectors.

Figure 6: Adjustment of the rural industry sector

Original I-O table

	Agriculture	Rural	Food	Textiles	Other industry	Service	Final Demand	CT
Agriculture		10						
Rural	10	10	20	20	10	10	20	100
Food		20						200
Textile		20						200
Other industry		20						100
Service		10						
VA		10						
CT		100	200	200	100			

Note: Rural, Food, Textiles, and Others stand for Rural industry, Food industry, Textile industry and Other industry, all related to the Rural industry sector.

1. Distributing row vectors according to CT structures of related sectors

	Agriculture	Rural	Food	Textiles	Other industry	Service	Final Demand	Δ CT
Agriculture								
Food	→ +4	+4	+8	+8	+4	+4	+8	+40
Textiles	→ +4	+4	+8	+8	+4	+4	+8	+40
Other industry	→ +2	+2	+4	+4	+2	+2	+4	+20
Service								
Rural	← 10	10	20	20	10	10	20	100

2. Distributing the column vectors rowwise, by changed CT

	Agriculture	Food	Textiles	Other industry	Service	Final Demand	CT	Rural
Agriculture		+4	+4	+2				10
Food		+9.6	+9.6	+4.8				20+4
Textiles		+9.6	+9.6	+4.8				20+4
Other industry		+8.8	+8.8	+4.4				20+2
Service		+4	+4	+2				10
VA		+4	+4	+2				10

ΔCT		+40	+40	+20			
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4.3 Adjusting the machinery-repair sector

In the CIO sector classification (124-sector), there exists a machinery-repair sector, which is not included in the AIO sector classification. We assumed that more capital formation required more repair activity; therefore, we were able to distribute the row vector for the machinery-repair sector according to the GFCF (Gross Fixed Capital Formation) matrix of the corresponding machinery-industry sector (Table 6, below).

Table 6: Industrial sectors in the AIO sector classification related to the MR sector

	AIO sectors
Machinery repair	44. Boilers, Engines, and turbines
	45. General machinery
	46. Metal working machinery
	47. Specialized machinery
	48. Heavy Electrical equipment
	49. Television sets, radios, audios and communication equipment
	50. Electronic computing equipment
	51. Semiconductors and integrated circuits
	52. Other electronics and electronic products
	53. Household electrical equipment
	54. Lighting fixtures, batteries, wiring, etc.
	55. Motor vehicles
	56. Motorcycles
	57. Shipbuilding
	58. Other transport equipment
59. Precision machines	

As shown in Figure 7, the assumed intermediate uses of the MR sector in the Agricultural, GM, MM, OM, MR, and Service sectors were 10, 40, 30, 30, 40, and 10, respectively, the final use was zero, and the CT of the MR sector was 160. Columnwise, the intermediated inputs of the MR sector from the Agricultural, GM, MM, OM, MR, and Service sectors are 10, 40, 30, 20, 40, and 10, respectively, the initial input (value added) was 10, and the total input of the MR sector was 160. We first estimated the GFCF matrix based on the primary data from NBS, then distributed the row vector for the MR sector by input structure of each related sector into the GFCF matrix. It can be seen that the inputs of Agriculture from the GM, MM, and OM sectors rose by 3, 4, and 3, separately, and so did those of the GM, MM, OM, MR, and Service sectors; therefore, the CTs of GM, MM, and OM increased to 71, 47, and 42, respectively. (It must be mentioned that the value of “discrepancy and others” in the row vector for the MR sector had to be distributed into these sectors according to the structure of the column vector for gross capital formation.)

Second, the column vector for the MR sector was distributed rowwise by changed CT of each sector (+59, +42, +38, and +20, respectively) generated from the row vector distribution. After this adjustment, the MR column vector was disaggregated into the intermediate transactions of related machinery industries.

Figure 7: Adjustment of the machinery-repair sector

Original I-O table

	Agriculture	GM	MM	OM	MR	Service	Final Demand	Total Output
Agriculture					10			
GM					40			
MM					30			
OM					20			
MR	10	40	30	30	40	10	0	160
Service					10			
Value added					10			
Total Input					160			

Note: GM, MM, OM, MR stand for General machinery, Metal working machinery, Other machinery sectors and the Machinery-repair sector.

Assumption: Level of repair activity depends on amount of capital input.

1. Estimating GFCF (Gross Fixed Capital Formation) Matrix

	Agri- culture	GM	MM	OM	MR	Service
GM	3	8	5	6	8	4
MM	4	4	7	2	5	3
OM	3	4	3	2	7	3

2. Distributing row vector according to the input structure of the GFCF matrix

	Agri- culture	GM	MM	OM	MR	Service	Final Demand	ΔCT
Agriculture								
GM	➔ +3	+20	+10	+18	+16	+4		+71
MM	➔ +4	+10	+14	+6	+10	+3		+47
OM	➔ +3	+10	+6	+6	+14	+3		+42
Services								

MR	10	40	30	30	40	10	0	160
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3. Distributing the column vectors rowwise, by changed CT of the row

	Agri- culture	GM	MM	OM	Ser- vices	Final Demand	Total Output	MR
Agriculture		+4	+3	+3				10
GM		+25	+16	+15				40+16
MM		+18	+12	+11				40+10
OM		+15	+10	+9				30+14
Service		+4	+3	+3				10
Value added		+4	+3	+3				10

ΔCT		+71	+47	+42			
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5. PRACTICAL PROBLEMS

It is easy to find that some elements in the 2000 China import matrix, which we originally compiled based on the survey results and related adjustments, are greater

than the corresponding ones in the national table. In 1985, 1990, and 1995, China's total commodity imports were \$42.3 billion, \$53.4 billion, and \$132.1 billion, which accounted for 14.0, 13.9, and 18.9 percent of GDP, respectively. However, in 2000 total commodity imports reached \$225.1 billion, accounting for 20.8 percent of GDP¹. We believe that this is an important reason for the inconsistency of the results that came out. In 2004 China's commodity imports reached 34.0% of GDP, and this fact reminds us that we need to make some adjustments to the import matrix compilation method.

¹ China's GDP figure in AIO2000 is based on the updated China I-O table 2000 and does not reflect the results of the first National Economic Census published on Jan. 19, 2006.

INDONESIA

Badan Pusat Statistik (BPS)
Statistics Indonesia

1. INTRODUCTION

1.1 Brief History of the national I-O Table

The first Indonesia Input-Output (I-O) Table was for 1971 and covered 175 industrial sectors. Since then, the Indonesia I-O Tables have been compiled once every five years. This is because the economic structure and technology used in the production process are such that it is necessary that they be presented within five years. The I-O Table 2000 is the seventh produced by BPS. The previous tables, in addition to the 1971 table, were for 1975, 1980, 1985, 1990, and 1995.

Experience has inspired BPS to develop a system that would be compatible with the data conditions and facilitate quicker compilation. The quality of the table is also expected to better, to more accurately reflect the actual data. The methodology, system, and tools used in the compilation are becoming better established with subsequent compilations.

The Indonesia I-O tables are widely used for analysis and planning, and they are extensively used at the local and regional levels. In preparing economic planning for the long term, the Indonesia National Economic Planning Agencies (BAPPENAS) have used national and regional I-O tables. This experience has induced BPS (Statistics Indonesia) to continuously provide the I-O tables at intervals of five years. In addition, the I-O table is not only an effective tool for economic analysis and projections in development planning but also provides a framework for evaluating and detecting data weaknesses. Hence, the tables can be used in providing input for improving the national statistical systems.

1.2 Features of the national I-O Table

In the Indonesia I-O table 2000 two valuations were used: the purchaser's price and the producer's price. The purchaser's price of a good includes any transport charges paid separately by the purchaser in order to take delivery at the required time and place. The producer's price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any VAT or similar deductible tax invoiced to the purchaser. It excludes any transport charges invoiced separately by the producer.

The format of the Indonesia I-O table basically follows the System of National Accounts (SNA) of the United Nations. The final-demand sectors consist of domestic final demand, exports, imports, and the domestic final demand is further disaggregated into private-consumption expenditures, government consumption expenditures, gross fixed-capital formation, and changes in stock. The value-added sectors comprise wages and salaries, operating surpluses, depreciation, indirect taxes, and subsidies.

Intermediate transactions reflect several characteristics and the structural change of the Indonesian economy. The number of intermediate sectors has been relatively stable over the years, ranging from 161 to 179, but the composition of industries has changed between 1971 and 2000. The largest change in number of sectors is observed in manufacturing. The number of manufacturing sectors has increased from 78 in 1971 to 92 sectors in 2000. Within manufacturing, the number of sectors related to pulp and paper, chemical products, and machinery has increased, while that for textiles, wood products, and petroleum products has decreased. These changes reflect the replacement of major industries in the course of the development of the Indonesian economy.

2. ESTIMATION WORK

2.1 Control Totals (CT)

2.1.1 Agriculture, Animal Husbandry, Forestry, and Fishery

The activities included in these four sectors are land cultivation, animal husbandry and poultry production, lumbering, other forest extractions, hunting, and fishing.

Simple processing activities for agriculture, animal husbandry, forestry, and fishery products, using traditional processes and tools, are excluded with these sectors but are included in the manufacturing sector.

Production data on rice, cassava, corn, sweet potatoes, groundnuts, and soybeans were obtained from BPS. Data on fruits and vegetables were obtained from the Directorate-General of Food Crops Development of the Ministry of Agriculture. Data on production of crops were obtained from the Directorate-General of Estate Production Development of the Ministry of Agriculture. Agricultural service falls under agricultural activities, data on which data were obtained from *SKIO (Special Survey on Input Output 2000)*.

Production of animal husbandry is defined as increase in number of cattle, as well as cattle products. Cattle size increase and weight gains are assumed to be equal to the sum of the number slaughtered, increase in population, and net export of livestock. Data on slaughtering and population of livestock were obtained from the Directorate-General of Animal Husbandry, while data on export and import of livestock were obtained from BPS. Data on animal-raising products (such as eggs and milk) were also obtained from Directorate-General of Animal Husbandry.

Forestry products include wood for logs, firewood, rattan, resin, and hunting products. Log wood consists of oak and nonoak woods (forest wood and nonforest wood). Data on log wood were obtained from the Forestry Department and Perum Perhutani. Woods and bamboo were counted by using data obtained from special research.

Data on the production of the sea, inland fisheries, and for shrimp were obtained from the Directorate-General of Catch and Fishery Cultivation of the Department of Fishery and Ocean.

Data on prices used for estimated agricultural production were obtained mostly from BPS. These types of data include wholesale trade prices, retail trade, producers' prices, and import and export prices. Data on special auction prices of fish were obtained from the Directorate-General of Fishery. The prices used for estimating production are producers' prices (free of trade margins and transportation costs). Information on the values of trade margins, transportation costs, and marketed surplus were obtained from a special survey conducted by BPS.

2.1.2 Mining and Quarrying

Mining and quarrying covers all activities of mining, quarrying, and evaporation of sea water. The principal purpose of these activities is to extract some marketable materials from the ground or sea, be they solids, liquids, or gases.

Data on production in this sector were obtained from *The Annual Book of Indonesian Energy and Mineral Resources 2000* and *Statistics of Indonesian Petroleum* (Directorate-General of Oil and Gas). Data on prices and input structure were from a special survey conducted by BPS.

Per-commodity output was obtained by multiplying quantity produced by producer's price. Producers' prices of exported commodities such as crude oil, coal, tin ore, bauxite, etc. are assumed to be equal to their corresponding export prices.

The prices used to value domestic consumption of crude petroleum, coal, iron sand and noniron metal ores, sands, stone, and asphalt are domestic market prices, but the export prices are used to value their export values. Input structures were calculated by multiplying the input coefficients, obtained from a special survey.

2.1.3 Manufacturing

The manufacturing sector covers all production activities, which are to transform raw materials or semifinished goods into products of higher value or quality. The manufacturing process can be mechanical, chemical, or other process using simple tools or machinery. Manufacturing, agricultural, mining, or other industrial enterprises can do the processing. The services that support manufacturing, such as contracted services, repair and maintenance of machinery, ships, trains, and airplanes are also included in this sector. Repair of machinery owned by households and of motor vehicles are not included in this sector but rather in the service sector.

The source data for estimating the output and input structure of manufacturing sectors are *Industrial Statistics 2000*, *Survey of Small Scale and Cottage Industries of 2000*, and *SKIO 2000*. For some activities, such as oil processing and liquefied natural gas, the data from the Statistical Report of Mining Establishment and Pertamina were referenced.

Output data on small-scale manufacturing and handicrafts were based on the 2001 survey and had to be corrected to conform to 2000 standards. That was done by using growth-rate figures obtained from survey and census activities conducted by BPS. The kinds of survey and census are the 1975 small-scale census, the 1991 small-scale survey, and the 1996 economic census. Household industry surveys of 1975, 1979, 1982, and 1991 were also used.

Not all imported spare parts for machinery are used for assembly. Some are used in the repair and maintenance sector or in business or household sectors. Therefore, especially for the machinery sector, own repairs and maintenance are included as part of the owner's activity. For example, for cigarette manufacturers who repair on their own machinery, all the expenditures and revenues relating to such repair activity were incorporated into their business accounts, including the value added.

2.1.4 Electricity, Gas, and Water Supply

The electricity sector covers the activity of generating and distributing electric power carried out by PLN as well as that by non-PLN entities. The sector also covers electricity produced by estates, manufacturing, and other sectors, except that produced for own consumption.

The gas sector covers the activities of providing and distributing utility gas to consumers and to other sectors, as well as to households, by pipe. Utility gas is obtained through the distribution of natural gas. Only PT. National Gas Corporation (PGN) engages in this activity.

The water-supply sector covers the activities of refining, purifying, and treating by chemical process unrefined water to produce clean water, including its distribution by pipe to households as well as to other consumers.

Data on production, prices, and intermediate input of electricity were obtained from BPS, PT.PLN, and PT. PGN.

2.1.5 Construction

Construction covers construction activities carried out by both ordinary contractors (construction companies that provide construction services to others) and by special contractors (business units or individuals dealing with construction activities for own

use), such as government offices, private offices, households, and nonconstruction business units.

Output of the construction sector was estimated, using the commodity-flow approach, an output-estimation method based on the amount of input use provided by other sectors. As a matter of fact, it is known that the sum of the two types of inputs (intermediate and primary) is equal to output.

For the purpose of estimating the value of intermediate input, two sources may be distinguished: imported inputs and those domestically produced. Various data sources were used to derive information on both input types: statistics on imports, on large- and medium-scale manufacturing, on construction, and on agriculture, all of which are made available by BPS. Estimates of administration costs, primary inputs, and distribution with regard to output in the construction sector were based on the construction component, special I-O surveys (*SKIO*) on construction, and on *Statistics of the Construction Sector*.

2.1.6 Trade, Restaurants, and Hotels

Trade activities involve purchasing and selling of goods, not only new but also second-hand goods, with distribution to consumers without change in the form of the goods. Restaurant activities usually involve the sale of prepared food and refreshments, normally consumed as they are served, not only in fixed but also unfixed locations, as in the case of street vendors. Hotel activity is defined as the provision of temporary accommodations for the public on a commercial basis, using part or all of a building. However, bungalows, flats, villas, and other lodging facilities, owned and run by enterprises or agencies mainly for their own use, are not included.

Output data on wholesale and retail trade were estimated, using the commodity-flow approach (by summing the trade margins resulting from domestic trade of all recorded merchandise transactions). The ratio of each of these trade margins to the respective sector output and to the sector import were calculated based on the results of *SKSPJ (Special Survey of the Trade and Services Sector) 2000*. Output data on restaurants were obtained from “Household consumption outside,” from the *Socioeconomic Survey (SUSENAS)*. Output data on hotels were derived by multiplying the number of hotel rooms by the average rate per room-night. Input structures for trade, restaurants, and hotels were obtained by multiplying their respective input coefficients by the

output value of each, collected by *SKSPJ*.

2.1.7 Transportation and Communication

This sector covers transportation activities, services related to transport, and communication. Transportation activities include transporting of cargo and passengers from one place to another on a commercial basis.

The estimate of output and input of railway transport was obtained from the *PT. KAI 2000 Financial Account Summary*. Output and input structures of road transport were estimated from statistics on motor vehicles and lengths of roadway and from the 2000 *SKSPJ* data. Output of sea transport was estimated by multiplying numbers of cargo containers and passengers by their respective fares. Data on cargo and passengers were provided by the Indonesia National Ship Owners' Association (INSA). Data on average fare per unit were derived from annual reports of shipping companies, while its input structure was estimated based on *SKSPJ*.

The production indicators for river and lake transportation were provided by the Office of River, Lake and Ferry Transport (DLLASDP), and per-vessel average output was calculated based on results from *SKSPJ*. Output and input data for air transport were taken from results of a survey of air carriers conducted by BPS. Data on services related to transport were selected from loading and unloading statistics, air-transport statistics, Jasa Marga, Inc., and Angkasa Pura, Inc.

The output and input data on the communication sector were obtained from the annual reports and profit-and-loss statements of three state enterprises: PT. Indonesian Post, PT. Telkom, and PT. Indosat.

Output of railway transportation was obtained from addition of income from cargo and passenger fares, station fees, and other revenue sources related to railway transport. The output of roadway transportation was derived by multiplying the number of vehicles by the average output, weighted for class of vehicle. The output of sea transportation was obtained by summing the incomes from cargo and passenger fares.

Output of the river and lake transport activities was estimated by multiplying the number of vessels by average output per vessel. The output of air transportation was obtained by summing output of all national airlines. The output of services related to

transport was estimated according to the number of vehicles, vessels, and aircraft served and the service fees or average paid by transportation providers for the services. Output of toll roads was the sum of revenues from toll roads and bridges.

2.1.8 Banks and Other Financial Institutions

Data on banking were obtained from Bank Indonesia, while data on insurance was from the *2000 Report on Insurance Activities* provided by the Financial Institution Directorate of the Ministry of Finance. Data on the output of renting of residential buildings were gathered from the results of the *1999 SUSENAS*. Data on output of nonresidential building leasing and the number of business-service enterprises were obtained through *SKSPJ*. Data on output on banking activities were obtained directly from Bank Indonesia.

Data on other activities were obtained from the following sources:

- (1) Pawnshops: *2000 Annual Reports of Pawnshop Companies* (Perum Pegadaian)
- (2) Nonbank financial institutions: Directorate of Financial Institutions, Ministry of Finance
- (3) Credit cooperatives: Computed by multiplying the number of credit cooperatives by the average output per cooperative (figures from the *Statistics of Cooperatives* and *SKSPJ 2000*).

Output of life and nonlife insurance, social insurance, and reinsurance was recapitulated to obtain the output of insurance activities. Output of residential leasing was obtained by multiplying the sum of per capita household expenditure on housing, rent, taxes, and maintenance by the midyear population figure. Output of nonresidential leasing was obtained by multiplying the number of workers by such output average per worker, data on which were obtained from *SKSPJ*. Output of business services as a whole was calculated by multiplying the number of enterprises and by the average output per enterprise.

2.1.9 Services

Data used for estimating the output and input structure of this sector were obtained from various sources. Data on central government and defense were obtained from the Directorate of Budget of the Ministry of Finance, and those for local government were taken from the KI, KII, and KIII questionnaires collected by BPS.

Output indicators for public services were acquired from the Ministry of Social Affairs, Ministry of Health, Ministry of National Education, and some other sources. Data on input structures were mainly based on *SKSPJ*. Output indicators for entertainment and recreational facilities were gathered from the Ministry of Communication and Information, while their input structure was mainly based on *SKSPJ*. Output indicators for repairs and personal and household services were the number of workers in each of those sectors, obtained from the *2000 Population Census*. Their input structures were obtained from *SKSPJ*.

Output data on public administration were measured by total compensation of employees of central and local governments allocated in the routine and development budget, as well as depreciation of capital goods. Output of community services was calculated by multiplying the number of students at the various school levels, number of hospital beds, number of medical doctors, number of orphans, and the number of elderly, etc. by their respective average outputs. Output of film production was acquired by multiplying the number of motion pictures produced by the average output per film, while the output of motion picture distribution was obtained by multiplying the rate of film rental by the output of movies.

Output of movie theaters was obtained by multiplying the number of seats by the average output per seat. Dividing entertainment taxes received by the government by the rate of entertainment taxes then subtracting the output of movies yielded the output of theaters.

Output data on other entertainment and recreational services were generally calculated by multiplying the number of enterprises or number of workers by their corresponding average output. Output of repair stations and personal and household services was obtained by multiplying the number of workers by average output per worker. Output of domestic servants, babysitters, and the like were obtained by multiplying per capita expenditure on domestic servants by total population.

2.2 Final Demand

2.2.1 Household Consumption Expenditure

The basic data used for the estimation of household consumption were acquired from the *1999 SUSENAS*. The demand elasticity of income estimated for 1999 and 2000

was used to estimate the value of the 2000 consumption expenditures. By this method, per capita consumption on various kinds of goods and services was estimated, while total consumption was obtained by multiplying per capita consumption by total population in 2000. Data on retail prices obtained from BPS were used to estimate the values for food consumption.

2.2.2 Government Consumption Expenditures

Data on the central government's routine expenditures were obtained from the central government's figures on actual routine purchases, which the Ministry of Finance provided in the form of budget breakdowns. Data on regional governments' routine expenditures were obtained from the result of the compilation of the regional government financial survey gathered annually by BPS.

2.2.3 Gross Fixed-Capital Formation

The method used for estimating fixed-capital formation figures was the commodity-flow approach for the supply of capital goods, whether domestically produced or imported.

The value for construction capital formation was obtained from the output of the construction sector, which had been counted as construction capital formation. The data used for this calculation were obtained from the same source as those used for the construction sector.

The data used for estimating capital-formation figures on machinery and equipment were gathered from import statistics and *Large- and Medium-Scale Manufacturing Statistics 2000* published by BPS.

2.2.4 Change in Stocks

Data on change in stocks were obtained from a reconciliation process, using the difference between the value of allocated output and the amount of output available.

2.2.5 Exports and Imports

The data used for estimating import and export values of goods and services were obtained from *Statistics of Export and Statistics of Import* published by BPS, *Indonesian Economy and Finance Statistics* published by Bank Indonesia, *Indonesian Annual Mining Statistics* published by the Ministry of Energy and Mineral Resources, and other data sources. The estimation methods are described below.

(a) Export of Goods

The data used for estimating the values of export of merchandise trade are from BPS's *Foreign Trade Statistics*. The export data were derived, using the carryover method. For the purpose of I-O 2000, however, the export data must reflect the actual value of transactions that took place in 2000 only. Therefore, the results produced with the carryover method had to be corrected. These export values are classified according to the Harmonized System (HS).

(b) Export of Services

The data for estimating the values of export of services were obtained from *Indonesian Economy and Finance Statistics* published by Bank Indonesia. In that publication, the values of export of services are still combined with the values of import of service. Therefore, in order to estimate the values of export of services various additional information was gathered directly from Bank Indonesia.

(c) Import of Goods

Data obtained from *Statistics of Import* published by BPS were used for estimating the values of merchandise imports. The values of imports were calculated using the carryover method. The values of merchandise imports were classified according to the HS. Adjustments were also made for several manufactured products: refined oil, ships, motor vehicles (excluding motorcycles), aircraft, etc.

(d) Import of Services

The estimates for import of services were derived, using the data obtained from the same source as for export of services: *Indonesian Economy and Finance Statistics*. The information needs, the approach, and the method of estimation used here were similar to those for export of services.

2.3 Value Added

The approach used in estimating the value added of economic sectors was through production, based on the availability of production and price data for each economic sector. For the agriculture, mining and quarrying, manufacturing, trade, hotel and restaurant, transportation and communication, financial, and service sectors, we used the revaluation method, extrapolation, or deflation method.

Value added is derived through a total of all value added for each commodity. The value added itself is a residual amount of output at producers' prices minus intermediate inputs, which in practice is obtained by multiplying a rate of value added by output of a commodity or subsector.

2.4 Intermediate Transactions

The direct method (survey method) was used to compile the Indonesia I-O tables for all seven benchmark tables. These tables have different sizes of classification, as explained above. Input coefficients for each sector were obtained from special surveys.

The output and the input structure were obtained from various sources of data, as explained above. The data from the special surveys and the secondary data were processed and converted according to the codes for economic sectors. First, each output value within the I-O sectors was calculated by multiplying the amount of production (production indicator) by its corresponding commodity price (price indicator). These output values were also used as the input values for the corresponding I-O commodities (the value of output is equal to the value of input).

The results of the I-O special survey are the basis for the arrangement of the input structure of the I-O sectors. The questionnaire was processed according to the I-O codes and then proportioned to yield the input coefficients. The input structure consists of intermediate and primary input. The input structure of an I-O sector is multiplication of the output value by the corresponding input-structure coefficient obtained from the corresponding result of the special survey.

The structure of the final-demand component was obtained from results of the special survey and secondary data collected from the various institutions: the household consumption from *SUSENAS* that was converted to I-O code, the government consumption *Central Government Budgets (APBN)*, and capital formation from the structure of import goods and the large-scale manufacturing that was converted to I-O code. The export of goods and services is the result of conversion from the export values in HS code to I-O code. The arrangement of the changes in stock is still the residual from supply and demand.

2.5 Import Matrix

The import matrix was constructed from the column vector of goods and services, which consists of goods and services that were imported, import duties, and import taxes. The data on import of goods were obtained from *Statistic Import* in 9-digit HS code, on import services from the Bank Indonesia, and data on import duties and taxes are from the Finance Department of APBN and from *Import Statistics*, from BPS. The import value was valued in cost, insurance, and freight (CIF). The import structure of goods and services by economic sector was constructed by distributing the import values into intermediate and final demands.

The first step in distribution of the imports into economic sectors was done by identifying the import destinations. The destination of imported goods is identified by HS code, according to intermediate as well as final demand. The identification was done manually in accordance with sectors with direct need for a given imported product. The destination was identified by HS code and I-O code.

The second step was to distribute the import values by HS code into known sectors. The destination of each import value was determined based on the proportion of the row sector for the destination, and the proportion was obtained from the total cost within the sector. Final reconciliation and adjustment created the import matrix.

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

The values represented by trade margins and transport costs are the differences between transaction values at consumers' or purchasers' levels and those at producers' levels. Therefore, the differences between these two transaction levels reflect: (1) profits accrued to wholesalers and retailers, and (2) transport costs that arise during the distribution of goods from producers to final consumers.

In the process of gathering data on prices and input structures of the production sectors, data on transactions based on purchasers' prices were easier to obtain than those based on producers' prices. In practice, therefore, a transaction table based on

purchaser's prices is usually constructed first, from which the transaction table based on producers' prices is then derived, with the use of transport-cost and trade-margin matrices.

The margin values were estimated, using the commodity-flow approach, by investigating, for each commodity that passes through trade sector, the rate of wholesale margin, retail margin, and transport cost relative to the corresponding producer's price. The price data used for estimating the three rates are:

- a. Producer's price data, wholesale prices, and consumer prices, collected by BPS for constructing price indices
- b. Data on unit values, especially for export of goods, import of goods, and domestic-industry products

The margin rate was derived based not only on the points above but also on the 1999 and 2000 *SKSPJ*.

3.2 Import duties and import commodity taxes

The sources of import taxes and duties were obtained from on the *National Budgeting Form* from the Financial Department. The value data on import duties and commodity taxes were available for total value. In addition, BPS provided data on import duties and commodity taxes by HS code. The two sets of source data were compared to ensure reliable structure data, by total value from the Bank Indonesia and by structure sector from BPS.

3.3 International freight and insurance

International freight and insurance were estimated based on records of import transactions, listed both by FOB and CIF. Data on FOB transactions were obtained from Bank Indonesia, while the value of cost, insurance, and freight was obtained from *Balance of Payments*, from Bank Indonesia.

3.4 Employment matrix (ref. to Figure 2)

In the I-O table, employment is defined as the number of people working, full or part time, during the year (man-years).

The number of workers engaged in production activities of each sector is assumed to be the same as the total number of workers or persons working at least one hour during the week prior to enumeration. The number of workers, in this case, also includes employment seekers who had once been employed.

The sets of data used to estimate the number of workers basically consist of employment data by sector and by status. Data on employment by sector were obtained from the same sources mentioned in the previous description, while data on the number of workers by status were obtained from the *2000 National Labor Force Survey (Sakernas)*, by BPS.

The estimation of labor matrix by AIO 2000 code can be explained as follows:

- 1) Labor force data available by main job, side job, and by three-digit Indonesian Standard Industrial Classification (KBLI2000)
- 2) Number of workers in the labor force are available by status (employees, own-account workers and unpaid family workers) and two-digit Indonesian Standard Industrial Classification, with the total given as a total number of main jobs (excluding side jobs)
- 3) The two kinds of data described above were converted into 76 sectors according to AIO code, with some sectors aggregated and others disaggregated.
- 4) Number of workers in the labor force by AIO sector already listed for main job and side job were distributed, using the composition of main job

4. CODE CONCORDANCE

The compilation of total and domestic tables at producers' prices was based on the original Indonesian I-O table, which has breakdown into 175 sectors. Several tasks were involved in calculating the AIO 2000, such as disaggregating the 175 sectors of the Indonesia I-O table into 186 sectors. The objective of such disaggregation was to make the Indonesia I-O table directly compatible with the AIO classification of 76 sectors. The following sectors had to be disaggregated from 175 sectors to yield 186 sectors:

- 071 Alcoholic beverages into:
 - 071A Other food products
 - 071B Soft drinks
- 114 Other nonferrous products into:
 - 114A Cement and cement products
 - 114B Other nonmetallic mineral products
- 124 Machinery and apparatus into:
 - 124A Boilers, engines, and turbines
 - 124B General machinery
 - 124C Metal-working machinery
 - 124D Specialized machinery
- 127 Communication equipment and apparatus into:
 - 127A TV, radio, and communication equipment
 - 127B Electronic-computing equipment
 - 127C Semiconductors and integrated circuits
 - 127D Other electronics and electronic products
 - 127E Other services
- 150 Repair of shop n.e.c. into:
 - 150A Motor -vehicle repairs
 - 150B Motorcycle repairs
 - 150C Other vehicle repairs

After we achieved classification into 186 sectors, an aggregation process was needed in order to arrange the data into 76 sectors. The aggregation is much simpler than the disaggregation process, requiring only summing up to yield the smaller number of sectors as per the AIO classification.

Figure 1: Process of Compilation of the Indonesian Input-Output Table 2000

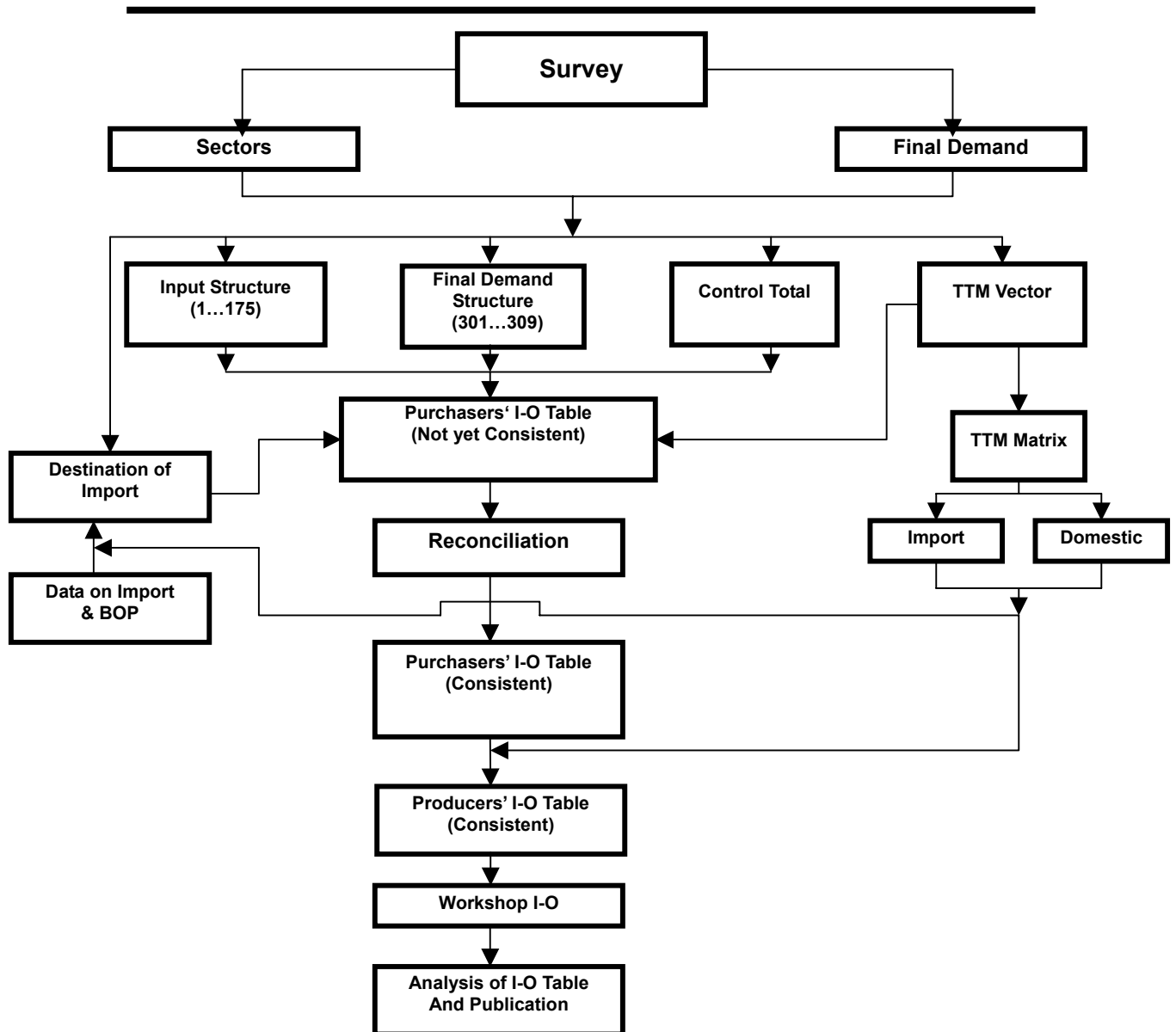
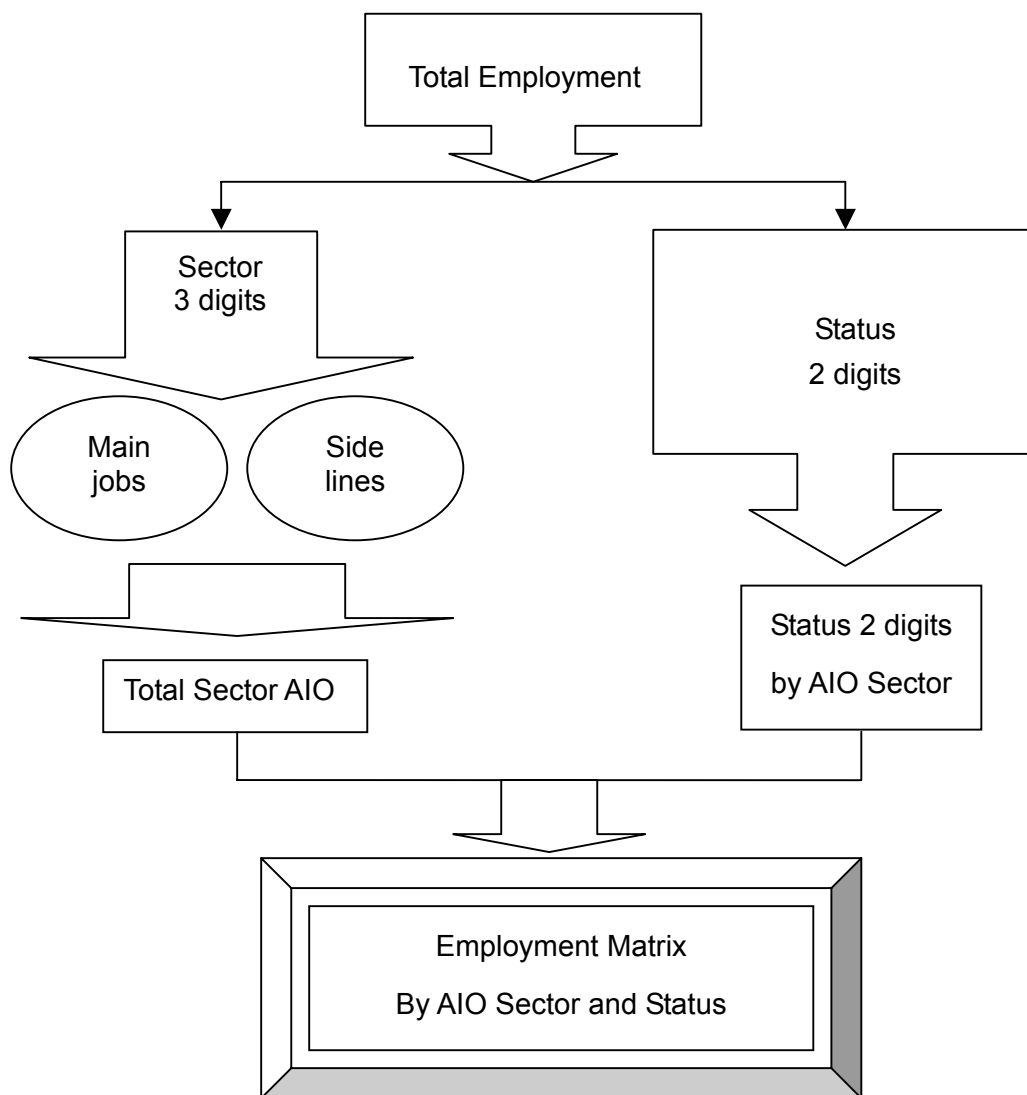


Figure 2: Compilation of the Employment Matrix, by Sector and Status



KOREA

The Bank of Korea

1. INTRODUCTION

1.1 Brief history of the national I-O table

The history of Input-Output tables in Korea began with the attempt to compile the 1957 and 1958 Input-Output tables by the Committee for Industrial Development of the Ministry of Reconstruction in 1958. In the strict sense, however, these tables were more in the nature of a trial balance rather than complete tables, owing to the insufficiency of basic statistics, lack of experience, electronic data-processing constraints, etc.

Therefore, the first compilation of complete Input-Output tables in Korea was not done until 1964. The Bank of Korea, at the request of the government, started the project to compile the 1960 Input-Output tables in 1962 and published them in 1964. Since then, the Bank of Korea has itself compiled the Input-Output tables for the benchmark years of 1963, 1966, 1970, 1975, 1980, 1985, 1990, and 1995 and updated versions of the seven latter ones in 1968, 1973, 1978, 1983, 1986, 1987, 1988, 1993, and 1998. The 2000 Input-Output tables are for the tenth benchmark year.

Linked Input-Output Tables, which link each benchmark table, and are then revalued at constant prices, have also been compiled for 1975–1980–1985, 1980–1985–1990, 1985–1990–1995, and 1990–1995–2000.

1.2 Features of the national I-O table

The Input-Output tables for Korea have been compiled using an open model that comprises both endogenous and exogenous sectors. The number of endogenous sectors is 404 (in the 2000 Input-Output tables), including three dummy sectors, and the exogenous sectors consist of final demand and value added. Final demand is classified

into six items: private consumption expenditure, government consumption expenditure, gross private fixed capital formation, gross government fixed capital formation, increase in stocks, and exports. Meanwhile, value added is classified into five items: compensation of employees, operating surplus, depreciation of fixed capital, indirect taxes, and subsidies (negative).

Domestic and import transaction tables at producers' prices, input coefficient tables, and various induced coefficient matrices are listed. In addition, a trade margin table, transportation cost table, and an employment table have been compiled as supporting tables.

Output of goods and services is valued at producers' prices, including value-added taxation on products and at purchasers' prices with transport and trade margins added to the producers' prices.

In the case of the import table, we compile that in competitive type. Specifically, imported and domestic goods are recorded in different tables. Transactions of exported goods are valued at the FOB price, and transactions of imported goods are valued at the CIF price.

The sector classification in the 2000 tables is based on the Korean Standard Industrial Classification (KSIC) and has been achieved mainly by dividing, incorporating, or abolishing the sectors in the 1995 tables, or by establishing new ones to reflect the changes in the domestic industrial structure resulting from technological advances, changes in the structure of relative prices, etc. The 404 resulting basic intermediate sectors are aggregated into 168, 77, and 28 sectors for analytical purposes.

2. ESTIMATION WORK

2.1 Control Totals (CT)

Domestic production consists of all the goods and services produced within Korean territory during the relevant period. Hence, it includes production by foreign individuals and companies in Korea but excludes that of Korean individuals and companies abroad. The exception to that is that any production by Korean embassies or

consulates abroad is included in domestic production, while that by foreign embassies or consulates in Korea is excluded, as is that by U.S. and other U.N. forces and by international institutions within Korean territory.

In the case of goods, domestic production can be estimated by multiplying the volume of production during the relevant period by the average market price of one unit. For the service sectors, we regard companies' total revenues as domestic production, with a few exceptions. We estimate the domestic production of the general government and that of private nonprofit institutions at their total input costs. With regard to the trade sector, domestic production is estimated by the margin, that is, the difference between the selling amount and the purchase amount.

For CT estimation of the manufacturing sectors, we referred to mainly the *Report on Mining and Manufacturing Survey* published by the National Statistical Office, and also referred to various other production statistics. For example, the statistics produced by the Korea Association of Information & Telecommunication contained useful information on the electronic sectors.

The gross outputs of FISIM (Financial Intermediation Services Indirectly Measured) and house rents are estimated by imputing the utilities that are not actually transacted in markets but are received by the users.

Some notable sectors showing changes in the method of CT estimation or in treatment are as follows:

① Computer Software Development and Supply

This sector was previously included in Computer Programming, Data Processing, and Other Computer Related Services in the 1995 Korea I-O classification. As the volume of and the interest in this sector increased, it became a separate sector in the 2000 Korea I-O.

As the 1993 SNA recommends, computer software that would be expected to be used for more than one year has been regarded as fixed capital formation.

Computer software can be divided into three groups:

- 1) Customized software: All customized software except its cost for maintenance is included in the fixed capital formation.

- 2) Prepackaged software: Software that is used for consumption expenditure and embedding into products is excluded from fixed capital formation. Software valued at under 500,000 won is also excluded from fixed capital formation.
- 3) Own-account software: All own-account software is treated as fixed capital formation.

② FISIM (Financial Intermediation Services Indirectly Measured)

In the case of FISIM, the method for CT estimation and distribution has been changed in accordance with the SNA '93. The SNA '93 recommends that the total value of FISIM be measured as the total property income receivable by financial intermediaries minus their total interest payable, excluding the value of any property income receivable from the investment of their own funds, as such income does not arise from financial intermediation. In addition, one possible way to allocate FISIM is to base the distribution on the difference between the actual rates of interest payable and receivable and a “reference” rate of interest. This “reference” rate was calculated as the weighted average of the deposit rate and the loan rate.

③ The control totals of “eating and drinking places” and “repair services” newly include costs for materials.

④ Estimation for Depreciation of Social Capital

Capital consumption was calculated with respect to fixed assets constructed to improve land, such as drainage systems, dikes, or breakwaters, or on assets constructed on or through land roads, railway tracks, tunnels, dams, etc. (6. 186, SNA '93)

⑤ Expenditures for Mineral Exploration undertaken on own account by enterprises engaged in mining or the extraction of fuels has come to be included in gross fixed capital formation.

2.2 Final Demand

2.2.1 Private Consumption Expenditures

Private consumption expenditures comprise two quite different types of expenditure: final consumption expenditures of households and self-consumption expenditures of private nonprofit institutions.

First, the final consumption expenditure of households represents the total amount of current consumption expenditure of households for goods and services in Korea minus the revenue from sales of used goods and scrap. The final consumption expenditure of households includes not only the expenditures for nondurable goods and services but also that for durable goods such as furniture, cars, etc. Expenditures for land and buildings are excluded, however. Expenditures for goods purchased but not consumed during the relevant period are also treated as consumption expenditures.

Second, self-consumption by private nonprofit institutions represents the difference between the total costs of the institutions and their revenues, if any, derived from sale of services to firms.

We estimate the domestic production of private nonprofit institutions at their total cost, because their services are, in general, not transacted in the market. As their services are mainly for households, however, we treat them as being purchased by households. These services are therefore included in private consumption expenditure.

In this area, because direct estimation of final demand is problematic, we chiefly depend on indirect data such as the *Annual Report on the Family Income and Expenditure Survey* and the *Report on the Household Economy Survey*, published by the National Statistical Office.

2.2.2 Government consumption expenditure

Government consumption expenditure is the current expenditure of government for activities of the general government. It also comprises, as in the case of private nonprofit institutions, self-consumption of government service producers. This category therefore indicates the difference between the current expenditure of government service producers, such as the national universities or the state hospitals, and their services.

In the 2000 KIO, public government, local government, research institutes (public), medical health services (public), social welfare services (public), sanitary services (public), and culture services (public) constitute this vector.

The commodity flow method is applied to the estimation of all details.

2.2.3 Gross Fixed-Capital Formation

We regard expenditures for visible fixed capital by firms, private nonprofit institutions, the government (except for military use), and public firms, as gross fixed capital formation. In accordance with the object of the expenditure, we divide gross fixed capital formation into private and government fixed capital formation. In the case of land, the land itself is excluded, but accompanying taxes and commissions are included in gross fixed capital formation, as are land-improvement costs.

The scope of gross fixed capital formation, in principal, comprises all capital goods whose physical life is longer than one year and whose price is higher than 500,000 won. In practice, however, goods that firms treat as current costs are excluded from gross fixed capital formation.

2.2.4 Increase in stocks

“Stocks” refers to such goods as raw materials, fuel, semifinished products, goods in production process, or finished goods that are held by each industry at a specific time for production or sales. “Increase in stocks” represents the difference between the amount of initial stocks and that of terminal stocks. Estimation of increase in stocks is made by multiplying the change in quantity by the year-average price per unit.

However, we do not count goods purchased by households, the government, or private nonprofit institutions for this category, assuming them to have been consumed.

2.2.5 Exports and Imports

In the case of commodities, Korean Customs Service data were used and reclassified. Exports were estimated on an FOB price basis, and imports were estimated on a CIF price basis. In the case of noncommodities, we used the Foreign Exchange Statistics of the Bank of Korea and other data.

2.2.5.1 Exports

The scope of exports includes goods and nonfactor services that residents sell to nonresidents. Presents in kind are also included in exports. Exports of goods consist of outward movements of merchandise across the Korean customs frontier and direct purchases by extraterritorial organizations and other nonresidents from residents.

Transactions of exported goods are, to begin with, valued at the FOB price. Therefore, among freight and insurance premiums, which are not included in the FOB price,

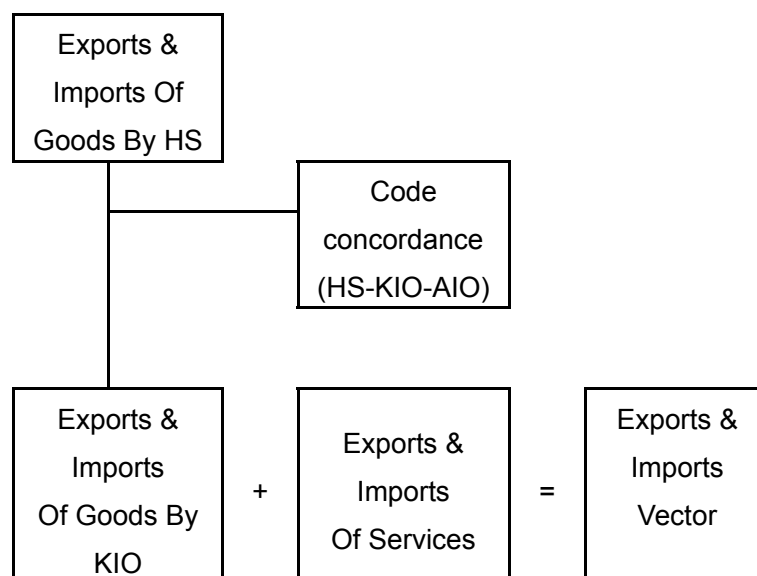
Korean firms' revenues are treated as exports of the transportation and insurance sectors. FOB prices are then converted to producers' prices by deducting transportation costs and trade margins arising in Korean territory.

2.2.5.2 Imports

Imports comprise all goods and services, including presents in kind, which nonresidents provide to residents. Imports of goods consist of inward movements of merchandise across the Korean customs frontier and direct purchases by residents from nonresidents. Imports of services also include all nonfactor services provided by nonresidents to residents.

Imported goods transactions are valued at the CIF price, which includes freight and insurance premiums relating to ocean transportation but does not include transportation costs and trade margins arising in domestic territory.

Tariffs and other imported commodity taxes are also included in total imports. This differs from the case with GDP statistics, in which tariffs and other imported-commodity taxes are treated as value added (indirect taxes), and are not included in imports.



2.3 Value Added

Value added comprises compensation of employees, operating surplus, depreciation of fixed capital, indirect taxes, and subsidies (negative). Survey results were mainly used for the estimation of value added, along with supplementary data from such publications as the *Financial Statement Analysis* of the Bank of Korea, Report on *Mining and Manufacturing Survey* of the National Statistical Office, etc.

2.3.1 Compensation of Employees

The compensation of employees comprises all payments in cash or in kind made by employers to their employees in remuneration for work done during the relevant period. Therefore, it includes gross wages and salaries, employers' actual social welfare contributions, retirement grants and so on, but excludes the costs of medical examinations, recreational facilities, and so forth, because they evidently benefit employers, too. The estimation of compensation of employees is made before taxation.

2.3.2 Operating Surplus

Operating surplus is a residual concept; consequently, it can be estimated by deducting all other components of value added from total value added. It consists mainly of operating profits, net interest paid and, net rent on land. However, revenues obtained from activities other than actual production, such as interest earned, dividends, and rent receipts, are not included in the operating surplus of the receiving sector, because they are already counted in the operating surplus of the paying sector. As the domestic production of government services and private nonprofit services to households is defined as equivalent to their explicit costs of production, there is no operating surplus in these sectors.

2.3.3 Depreciation of Fixed Capital

Depreciation of fixed capital represents the amount of saving for the depreciation of fixed capital used up in the process of production during the relevant period. This includes saving not only for normal wear and tear but also for the need for replacement due to technological obsolescence.

2.3.4 Indirect Taxes

Indirect taxes are defined as taxes levied on the production, sales, purchase, or use of goods and services. They can be divided into value-added tax, taxes on products, other

taxes linked to production, and various mandatory fees levied by central and local governments. Among indirect taxes, however, customs duties and commodity taxes on imported goods are not recorded in this sector but recorded in the import column. In the treatment of value-added tax, the net system applied in the 2000 tables is as in the 1990 and 1995 tables.

2.3.5 Subsidies

Subsidies represent current transfers that the government pays to private industries and public enterprises with the objectives of export promotion, price control, production encouragement, etc. Subsidies also comprise payments by the government to government-invested firms to make up for operating deficits caused by adherence to government policy. However, grants by the government to households and in support of private nonprofit services to households are not treated as subsidies. Since subsidies tend to lessen the domestic production of the receiving sector, we treat them as a deduction item.

2.4 Intermediate Transactions

In the case of the 2000 Input-Output Tables, we conducted input surveys to estimate the input structure for almost every industrial sector, including those in the Manufacturing; Mining and Quarrying; Agriculture, Forestry, and Fisheries; and the service sectors.

The population for sampling for Mining and Manufacturing is incorporated companies established under the Commercial Code, with five or more workers and over 500 million won in commodity sales in the *Report on Mining and Manufacturing Survey* published by the National Statistical Office. Services are establishments that belong to the service industry in the *Report on the Census on Basic Characteristics of Establishments* published by the National Statistical Office.

The PPS (probability proportion to size) method was used in sampling. This is a method in which establishments with higher sales have higher probabilities of being chosen as samples. Strata were chosen based on the I-O classifications. Among I-O classifications, each sector was divided into three strata according to size.

The final input structure of each KIO sector is fixed through coordination of data.

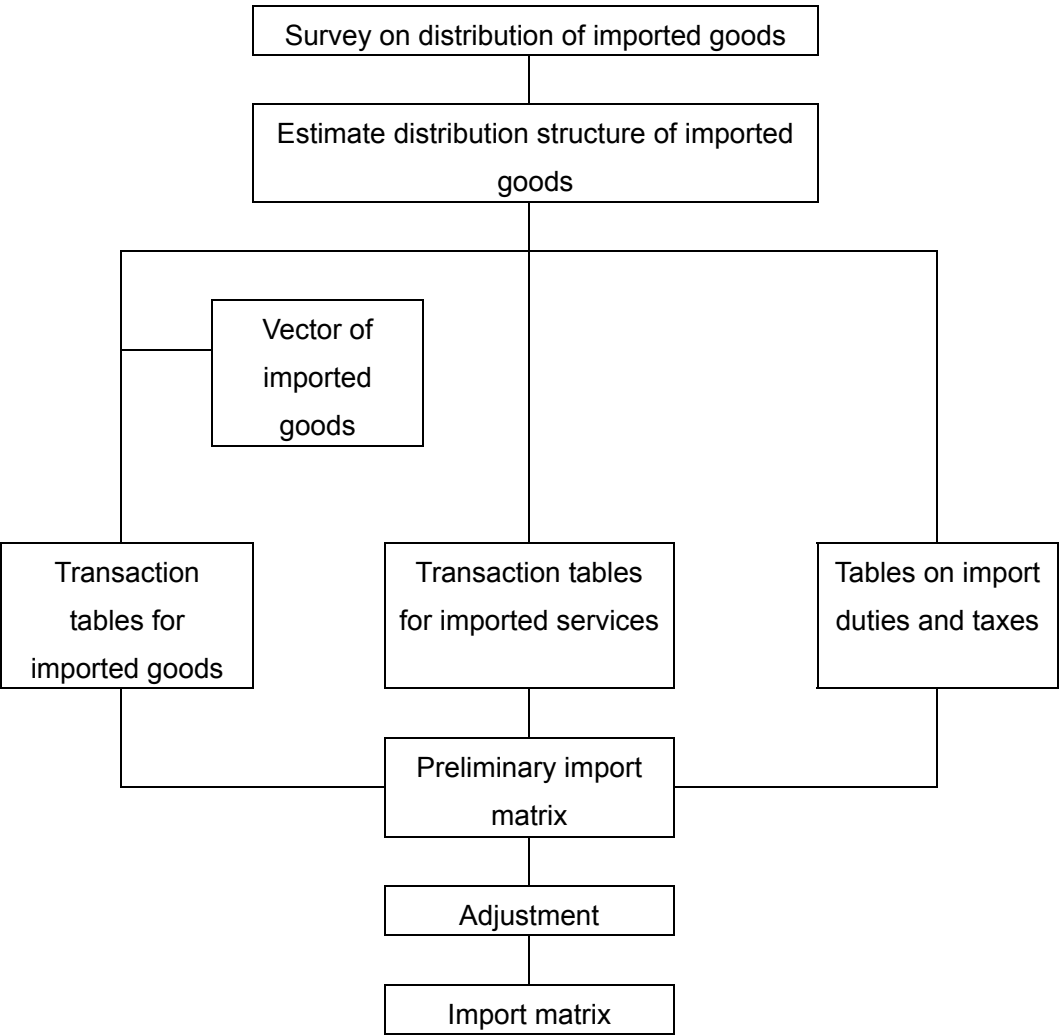
Coordination of data has to be done, because the estimation of input and output data is made separately for each part of the tables. In order to equate total supply and total demand, taking the domestic product as the control total that controls the other variables, adjustments are carried out on endogenous variables.

2.5 Import Matrix

2.5.1 Commodities

Trade data obtained from the Korea Customs Service are used. First, transactions that are not suitable for the concepts of the I-O Tables, such as re-exports and retained imports, are excluded. Then the data are converted to national I-O codes by matching with the HS codes. The distribution of the imported goods is dependent on the survey.

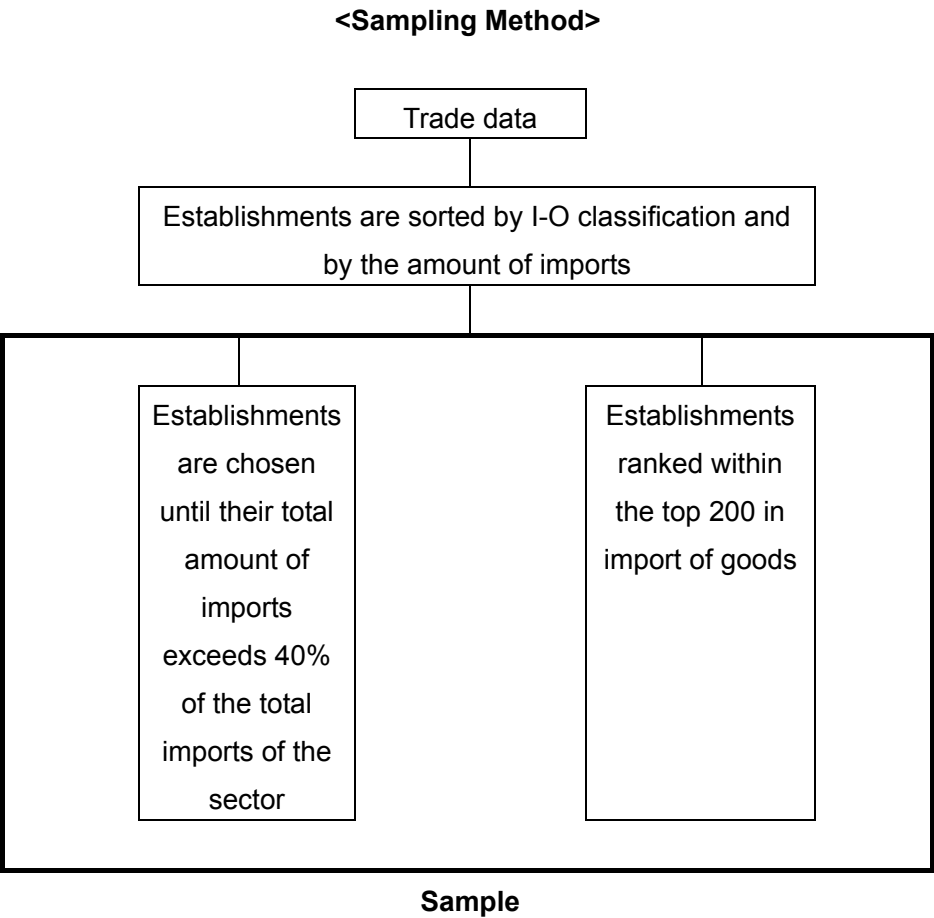
Flowchart



The population for sampling for the distribution structure survey of imported goods is from the commodity trade data from the Korea Customs Service, which has daily foreign-trade information for 2000.

Establishments for sampling for each I-O classification are chosen based, in descending order, upon their total values of imports. Two requirements must both be met: (1) that establishments sampled account for at least 40 percent of total imports for that classification, and (2) that at least the top 200 establishments in the classification are sampled.

The survey was carried out by visiting the establishments. Some interviewers were employed for assistance. The period during which the survey was taken was from February to July 2002. There were about 2,300 respondents.



<Questionnaire Form>

Questionnaire on distribution of the imported goods for the year 2000							
Name of Company						Person in charge	
Address						Telephone	
HS CODE	I-O CODE	HS NAME	Amount of Imports	Use of Imported Goods			
				CODE	RATIO	CODE	RATIO

2.5.2 Services

Estimated exports and imports of the service sectors include all trade of goods and services without customs formalities between residents and nonresidents. To estimate service exports and imports, we refer to the balance of invisible trade statistics in the Balance of Payments (BOP) and Gross Domestic Product (GDP) statistics, *Foreign Exchange Statistics* published by the Bank of Korea, and other related data. Five categories of services are estimated as follows:

① Travel

We regard the total amount of travel in the BOP statistics as the total of travel expenses. Using the BOP statistics and the data compiled by the Korea Tourism Organization, we divide total travel expenses into expenses of students studying abroad, of sightseeing tours, and of business trips.

② Transportation

We regard the amount of transportation in the BOP statistics as total transportation, which becomes a part of our service exports and imports estimation. We divide the total amount of transportation into passengers' fares, goods rates, stay expenses of ships and

airplanes, shipping services, flight services, rents for ships and airplanes, and so on.

③ Insurance

We make estimates of goods insurance, reinsurance against loss, life, and reinsurance from the BOP statistics.

④ Government Transactions

We estimate military and nonmilitary transactions, using the BOP and the GDP statistics. The total summation estimated is divided into the 404 sections of the KIO in accordance with the relevant data and survey.

⑤ Other services

The main data used to estimate the other-services sector in the KIO are BOP statistics and the Foreign Exchange Statistics compiled by the Bank of Korea. In order to adjust our 2000 KIO to the 1993 SNA, we compile export and import vectors of service, including compensation for technological services, royalties, and FISIM (Financial Intermediation Services Indirectly Measured). Exports and imports of services also include expenditures of overseas offices that are not in business, as well as the costs of construction requiring short terms of within one year.

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

Trade margins are divided into cost of commerce and circulation margin. The circulation ratio and mark-up ratio of each sector were estimated by survey and then applied to the transaction table to allocate margins and to estimate CT. Various statistics were used to estimate cost of commerce.

A similar method as described above was applied for the estimation of transportation margins.

3.2 Import duties and import commodity taxes

Levy and refund data relating to import duties and import commodity taxes obtained from the Korea Customs Service are used to compile the Import Duties and Import

Commodity Taxes vectors. However, the levied amounts and the real collected amounts of Import Duties and Import Commodity Taxes are unequal. Therefore, the levy data from the Korea Customs Service are utilized just to set the allocation ratios to each I-O code, and we use collected data in the *Statistical Yearbook of National Tax; the National Tax Service* as amounts of import duties and import commodity taxes.

In the case of import value-added tax, after dividing all I-O sectors into the Taxation, Exemption from Taxation, and Zero-Rate Taxation sectors, we compile the import value-added tax vector and matrix by applying a temporary import table to these three I-O sector classifications.

3.3 International freight and insurance

Statistics from the Korea Customs Service are used to estimate International Freight and Insurance. First, statistics from the Korea Customs Service are aggregated by country of origin and by AIO code (KIO-AIO code concordance is used) including the Freight and Insurance value for each trade. After that, we can calculate the International Freight and Insurance rate by, dividing the summation of International Freight and Insurance by the summation of trade data from the Korea Customs Service by AIO code for each country of origin. Finally, we obtain the International Freight and Insurance value for each AIO code by multiplying the international Freight and Insurance rate by the commodity import matrix of the country of origin.

3.4 Employment matrix

In the Korean employment matrix, workers are composed of wage and salary workers, self-employed, and unpaid family workers. The number of basic sector classifications is 168, and they are aggregated into 77 and 28 sectors for analytical purposes.

We refer to the *Report on the Census on Basic Characteristics of Establishments*, *Report on the Economically Active Population Survey*, *Agricultural Census Report*, *Fisheries Census Report*, *Report on the Construction Work Survey*, *Report on the Transport Survey*, and *Report on the Census of Wholesale, Retail Trade and Service Industry*, all published by the National Statistical Office, and the *Report on Monthly Labor Survey* of the Ministry of Labor for compiling the employment matrix.

These resources are mainly used for estimating the number of workers, but if there are conceptual differences between the KIO and the KSIC classifications in a certain industrial area, we do field surveys directly. In the case of working hours, we conduct field surveys for regular, temporary, daily workers, etc.

3.5 Others

3.5.1 Treatment of By-Products and Scrap

Secondary products of an economic activity are separated from the core activities and recorded in the sectors of those activities. However, by-products and scrap are treated in a different way.

There are generally four methods of treatment: the lump method, transfer method, separation method, and negative-input method. In the 2000 Input-Output tables, each of these methods is applied in accordance with the type of by-product or scrap, as follows:

- ① Lump method: rice straw, fur and hide of livestock, poultry manure, etc.
- ② Transfer method: advertising in newspapers, magazines, and broadcasting
- ③ Separation method: gas made by the coke industry, etc.
- ④ Negative-input method: scrap obtained in the course of production activities

3.5.2 Dummy Sectors

To assist in compilation of the tables, there are three dummy sectors added: Office Supplies, Business Consumption Expenditure, and Nonclassifiable Activities.

The Office Supplies sector comprises notebooks, writing pads and stationary, etc., used in the course of production activities of the intermediate sectors.

The Business Consumption Expenditure sector comprises goods and services purchased by producer units that benefit the unit as well as its employees. It includes the following:

- Entertainment Expenses of Industries
- Expenditures for Providing Amenities at the Workplace
- Expenditure on Sporting and Recreational Facilities for Employees

The Nonclassifiable Activities sector is provided not only to coordinate column and row totals and statistical errors but also to cover outputs which cannot be included in any other sector.

3.5.3 Domestic Commodity Taxes

For estimating domestic commodity taxes, we referred mainly to the *Statistic Yearbook of National Tax* published by the National Tax Service and *Annual Local Tax Statistics Report* published by the Ministry of Government Administration and Home Affairs, together with the *Settlement of an Annual Revenue and Expenditure* published by each central and local government

4. CODE CONCORDANCE

4.1 Adjustment for price

In the KIO, imports are valued at CIF plus duties and tax, while exports are valued at FOB, from which trade and transportation margins are subtracted. In the AIO, however, all prices should be valued at producers' prices. Therefore, the trade and transportation margins have to be subtracted from imports.

4.2 Sector changes in KIO

Because the Asian I-O to Korea I-O code concordance for year 2000 is mainly based on that of the year 1995, codes changes between 1995 and 2000 KIO are briefly introduced here.

Mineral and Spring Water (KIO code number: 085) and Manufactured Ice (086) are aggregated into Spring Water and Manufactured Ice (084). Unrefined Liquors and Rice Wine (081) and Other Liquors (083) are unified to Other Liquors (082). Otherwise, we separated five sectors to make nine sectors. Misc. Machinery and Equipment of Special Purpose (246) is separated into Machinery for Manufacturing Semiconductors (244), and Misc. Machinery and Equipment of special purposes (245). Telegraph and Telephone (348) is segregated into Telephone (347) and High-Speed Network Services (348). Depository Institutions (352) and NonDepository Credit Institutions (353) are

divided into Central Bank and Banking Institutions (352), NonBank Depository Institutions (353), and Other Financial Brokerage Institutions (354). Computer Programming, Data Processing, and Other Computer Related Services (363) was separated into Computer Software Development and Supply (364), and Computer Programming, Data Processing, and Other Computer Related Services (365).

4.3 KIO-AIO code matching

We encountered two problems, and resolved them as follows:

4.3.1 Business Consumption, Office Supplies (Dummy Sectors)

In the KIO, goods and services used for Business Consumption and Office Supplies aren't directly allocated to the industry but are allocated to Business Consumption and Office Supplies first. Then Business Consumption and Office Supplies are allocated to the industry. For compatibility with the format of the AIO, however, such goods and services were directly allocated.

<EXAMPLE>

Before adjustment					→ After adjustment				
sector	.....	a	b	c	sector	.....	a	b	c
A	.....	10	20	30	a	.....	10+ $40*20/(20+70)$	0	30+ $50*20/(20+70)$
B	.....	40	-	50	b	.....	0	-	0
C	.....	60	70	80	c	.....	60+ $40*70/(20+70)$	0	80+ $50*70/(20+70)$

*Sector b: Business Consumption and Office Supplies

4.3.2 Telecommunication

In the case of telecommunication, such as international telephone calls and foreign mail, imports are not directly allocated to the demand industry but make up the CT of the Telecommunication sector in the KIO. In the AIO, such imports were adjusted to be allocated to the demand industry directly.

<EXAMPLE>

Before adjustment

<domestic matrix>

sector	....		Tele.	
Tele.	....	300	400	500
			

<import matrix>

sector	....		Tele.	
Tele.	....		100	
			



After adjustment

<domestic matrix>

sector	....		Tele.	
Tele.	....	300- 100*300/800	400	500- 100*500/800
			



<import matrix>

sector	....		Tele.	
Tele.	....	100*300/800	0	100*500/800
			

5. PRACTICAL PROBLEMS

For the employment table, the request of the IDE is to submit the 2000 employment table in 76 sectors with three categories. However, we have just two categories; one is “Employee,” the other is “Own-Account Worker and Unpaid Family Worker.” We cannot separate Own-Account Worker and Unpaid Family Worker, mainly because of limitations to the information that we use for indirect resources in compiling the employment table.

MALAYSIA

Economic Indicators Division
& National Accounts Statistics Division,
Department of Statistics

1. INTRODUCTION

1.1 Brief history of the national I-O table

Input-output tables are compiled to provide comprehensive information on all the production activities of an economy. These tables are also used to record the transactions of goods and services between producers and users. The Department of Statistics has produced the Malaysia Input-Output Table 2000, based on the concepts and methods of System of National Accounts (SNA) 1968 and 1993. Previously, the reports for 1960, 1965, and 1970 were produced for Peninsular Malaysia, while those for Malaysia were prepared for the years 1978, 1983, 1987, and 1991.

1.2 Features of the national I-O table

For the national Input-Output Tables, the basic tables (commodity by industry) are estimated from available statistics. Meanwhile, the symmetric tables (commodity by commodity and activity by activity) are derived, using industry technology assumptions.

The Malaysia Input-Output Tables have used basic prices instead of producers' prices. "Producers' prices" refers to the price received by the producer for a unit of goods or service produced as output, including any tax payable or excluding any subsidy receivable on the product as a consequence of its sale or use. This excludes any delivery charges invoiced separately by the producer.

The size of the Malaysia I-O Table has varied over the years, mainly because of the emergence of new and important industries in the economy. However, the final size of a table is determined after taking into consideration the needs of all relevant government agencies. Therefore, the table for 1970 covered 59 sectors. The 1978, 1983,

and 1987 tables covered 60 sectors. The tables for 1991 and 2000 covered 92 and 94 sectors, respectively.

2. ESTIMATION WORK

2.1 Control Totals (CT)

2.1.1 Data sources and methods

Data are obtained from variety of sources: surveys/censuses carried out by the Department of Statistics, Malaysia (DOSM), surveys carried out by other government agencies, collection of data by government agencies for administration purposes, financial accounts, and other documents both published or otherwise relating to government enterprises, private companies, and other organizations. In addition, special research/investigation documents produced by institutes of higher learning and consultants as well as communication with individual firms, government bodies, and other bodies are also used.

In general, the following procedures were adopted in the compilation of the national accounts and Input-Output. For each item concerned, all available relevant statistical data were gathered, and adjustments were made for deficiencies or incomplete coverage.

2.1.2 Total output

Total production of goods and services includes the production by industries, the producers of government services, producers of private nonprofit services to households, and value of domestic services rendered by households. In principle, the goods are recorded in the system at the moment they are made, and the services are recorded at the time they are rendered. In the case of distributive trades (wholesale and retail), however, production is regarded as occurring at the time the commodities are sold. Production for own-account consumption (e.g., agricultural production consumed at a farm) and services provided by a dwelling occupied by its owner are also included in total production. All production of fixed assets, whether for own-account capital formation or otherwise, is included in total production in order to cover the production of industries, government departments, and other bodies engaged in own-account activities such as construction of buildings, structures, roads and other works.

2.1.3 Total input

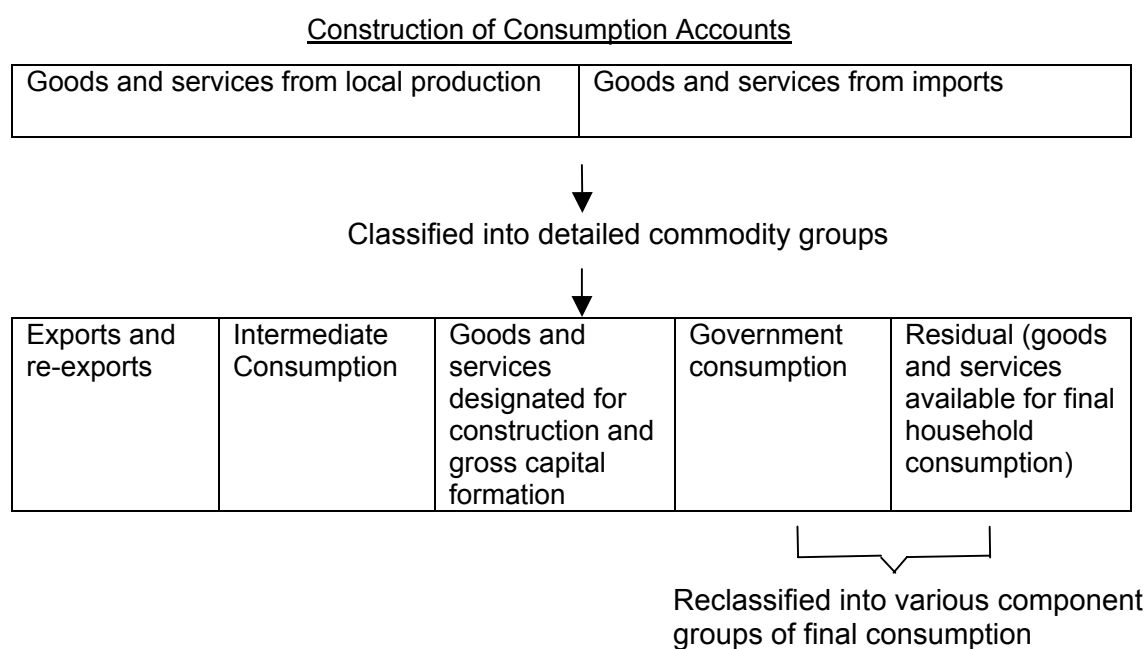
Intermediate consumption is the value of goods and services consumed (as input) in the production process. Excluded are depreciation of capital and net interest paid.

2.2 Final Demand

2.2.1 Consumption accounts

Estimates of final consumption have been made by allocating the available supply of goods and services from imports and local production to consumption accounts by the various component items.

In general, the procedures followed may be diagrammed as follows:



2.2.2 Capital formation account

In general, the data for estimation of gross fixed capital formation were obtained from the survey/census of the economy conducted in 2000 for activities such as construction, mineral exploration, and computer software. For the activities that were not covered in the survey/census of the economy 2000, data for estimation of gross fixed capital formation were obtained from financial reports.

It would have been possible to construct separate accounts if data relating to capital formation in each industry or sector had been available. However, with the lack of adequate statistical data, it was found that only a single consolidated investment account for the whole economy could initially be constructed.

For durable goods that can have multiple end uses, such as passenger cars, refrigerators, air conditioners, etc., proportions based on the detailed description of the commodities or informed judgments were made.

2.3 Value Added

The value added of an industry has been calculated as the difference between output and intermediate input.

2.4 Intermediate Transactions

Information on intermediate transactions was obtained from various sources: census, surveys, administrative records, and others. However, in circumstances where the input structure was deemed incomplete or overestimated, the current input-output ratio at the industry level derived from the Economic Census for 2000 was used as guidance in aligning the input structure for whichever commodities required adjustment, except in the agriculture sector, where specific estimation of input is done.

Industries by major sector

2.4.1 Agriculture, Forestry, and Fishing

Data on agriculture were obtained from various agencies, in particular the Ministry of Agriculture (MOA) and agencies underneath, as well as other sources related to agricultural products. Information on volume of production, prices, and inputs were adjusted, using available factors, to arrive at the intermediate consumption for each commodity. The adjustments were made because the available data on paddies, oil palm, rubber, coconut/copra, tea, forestry, and fish were underestimated.

Data obtained from MOA and its agencies are as follows:

- (a) Paddy production was estimated based on the prices of the farmers' produce recorded by MOA, and adjustments were made to arrive at the farm producers' prices. Information on intermediate consumption was mainly based on input

coefficients extracted from the various 2000 annual surveys on the major paddy growing areas in the country.

- (b) Data on oil palm, coconut/copra, and tea were obtained from the monthly as well as annual administrative reports by the estates. Intermediate consumption was patterned by special annual inquiries for the estates conducted by the Department.
- (c) Data on animals and poultry, except for animal feed, were obtained from the Department of Veterinary Services. Data on the number of animals slaughtered and prices received by farmers, as well as retail prices for meat, were obtained.
- (d) Forestry was obtained from the Department of Forestry, and appropriate adjustments were done to estimate the value of logs produced. Intermediate consumption was based on adjusted data derived from the Logging Survey. Data from these sources were verified against relevant information pertaining to own-concession operations reported by sawmills to the manufacturing survey.

Data on rubber was obtained from Annual Census of Rubber Estates 2000 conducted by DOSM.

Information on marine fish landings, prices received by fishermen (landed prices), and retail prices were obtained from the Department of Fisheries. Salting, drying, and other forms of fish preservation were treated as manufacturing activities and therefore excluded from the computation of the value of production of this industry. Activities such as fish rearing in rice paddies and other freshwater fishponds were also included in the estimates for the fishing industry.

2.4.2 Mining and Quarrying

Mining and quarrying were estimated based on the Annual Census of Mining and Annual Census of Quarrying carried out by DOSM. Data based on operations in crude petroleum were coordinated by PETRONAS, Malaysia's national petroleum corporation, and from the oil companies involved in the extraction of crude petroleum. These main sources provided information on production and inputs used in quantity and value terms.

2.4.3 Manufacturing

The estimates of gross value of production and intermediate consumption were based largely on the Annual Census of Manufacturing Industries 2000. The information

obtained conformed with the required concepts and was considered as fulfilling the requirements. As mentioned earlier, to ascertain the input structure, the input-output ratio obtained from the Economic Census is being used. For instance, the input-output ratio for Manufacture of electronic valves, tubes, and other electronic components obtained from the Census was 0.78. In a case where any commodity yields an input value perceived as over- or underestimated, we use this judgment to estimate the intermediate transaction.

However, adjustments have been made to output to allow for cost of nonindustrial services for all the industries, as well as for assembling/processing done on contract or for a fee by others for the assembly of motor vehicles, electronics, and palm oil processing industries.

2.4.4 Electricity and Water

This industry includes the generation and distribution of electric power and light for public use and supply of water. Data were obtained from the detailed accounts of the producers. Electricity generated by establishments in other industries for their own use is excluded from this sector.

2.4.5 Construction

Information obtained from the Annual Survey of Construction Industries was supplemented with results obtained from the analysis of government accounts and public corporations to obtain an overall volume of construction activity. Separate estimates were made for rural/urban own-account construction activities that would, in any case, not fall within the available supply of construction. These estimates were verified and reconciled against the available supply of construction materials according to data obtained from the manufacturing survey, import statistics, etc.

2.4.6 Wholesale and Retail Trade

The trade margins were calculated from a variety of sources: the Survey of Wholesale and Retail Trades and Catering, import prices, ex-factory prices reported by manufacturers, and retail prices. The purchasers' values were derived by adding the trade and transport margins for each commodity or group of commodities to producers' prices.

2.4.7 Hotels and Restaurants

The result from the Census of Selected Service Industries 2001 was adjusted to achieve estimates at a reasonable coverage. The adjustment was made based on informal discussions with a selected number of establishments in this industry.

For restaurants, information was obtained from the larger restaurants and restaurants-chain annual accounts. Estimations of these were also based on the Census of Wholesale and Retail Trades and Catering 2001.

2.4.8 Transport, Storage, and Communication

The main source for these activities was the Census of Transport and Communication 2001. The transportation sector consists of land, sea, and air transports. The coverage of this sector has been expanded to include road haulage, stevedoring, shipping agents, car-park facilities, storage and warehousing, cargo-handling services, and freight-forwarding services. The estimates of the value of production for road transport were made on the basis of the number of vehicles registered and information from the Census of Selected Industries 2000, which covered bus transport, taxi transport and road haulage.

Meanwhile, the communication industry covered telecommunications, postal services, and couriers.

2.4.9 Finance, Insurance, Real Estate, and Business Services

The finance sector included all commercial banks and other financial institutions. Reliable and comprehensive data were supplied by the Central Bank with respect to commercial banks and lending companies.

In most cases, these institutions are financed generally by the excess of interest earned on investments over interest paid to depositors. An imputation consisting of an amount for services rendered equal to the excess of interest received over interest paid is made. By doing so, a true reflection of the contribution of the banking sector on domestic product is made, and this would then be equal to the aggregated sum of salaries and wages, profits, etc. The imputed service charges are to be treated as intermediate consumption of industries. Similarly, the same principle was applied to other financial institutions. For insurance companies, the services rendered have been calculated as the excess of premiums received over claims paid.

Business services rendered by professionals in the private sector were valued with data collected from the Annual Census of Professional and Institutional Establishments. This covers accountants, architects, engineers, lawyers, and surveyors. Information relating to income received and expenditure incurred with respect to their professional activities was obtained. However, estimates were made by using demand information in the form of reported purchase values to yield an approximation of output for business services with partial or no available data.

2.4.10 Ownership of Dwellings

The gross value of the contribution by this sector includes rent actually paid on dwellings as well as imputed rent on owner-occupied dwellings. The results from the Census of Population 2000 and Household Expenditure Survey 1999 were used as the basis for this calculation.

2.4.11 Community, Social and Personal Services

Estimates relating to the “Social and Related Community Services” sector pertain to educational and medical facilities and services, in terms of value of services rendered. The cost of inputs incurred were obtained from the Annual Census of Professionals and Institutions.

Other data sources were obtained from analysis of their detailed financial statements. This sector also included activities pertaining to personal and household services. In addition, estimations were made based on the Census of Manufacturing Industries 2000 and other sources of data.

2.4.12 Producers of Government Services

This category consists of general public services, defense, education, health, social security and welfare services, housing, community and social, and economic services. Information on these was derived from an analysis of government financial statements.

There are four levels of government: federal, statutory bodies, state, and local. The goods and services provided by general government bodies are valued at cost, i.e., equivalent to the sum of their intermediate consumption, compensation of employees, consumption of fixed capital, and indirect tax (if any). However, enterprises at all levels of government were segregated and classified with the main body of industries.

2.4.13 Domestic Services to Households

The estimation of domestic services to households was made through employment data from Labour Force Survey and the Household Income Survey, as well as administrative data.

2.5 Import Matrix

Import data cover merchandise and services (transportation, travel, other services, and government transaction). Value of merchandise trade is compiled from customs declarations processed by DOSM. Value of services is obtained from various sources, including national carriers, the Central Bank, the Immigration Department, and various surveys such as the Quarterly Survey of International Investment and Services, the Survey of Foreign Airlines Companies in Malaysia, and the Census of Shipping Companies in Malaysia. Measures of travel receipts and payments are obtained from a variety of sources, including surveys carried out by the Tourist Development Corporation.

The import statistics are based on CIF values and follow the concepts and definitions recommended by international organizations.

For the output, import data are allocated to the commodities directly, and an estimate of demand has been made based on the total supply of domestic production and imports.

2.5.1 Estimation methodology

From the data sources mentioned earlier, further adjustment has been made during the balancing stage, based on expert based judgments, in order to improve the import structure for the particular commodities.

2.5.2 Estimation of import

Besides the regular surveys and compilation of import data, a special survey on usage of imported commodities was carried out in order to construct the latest input structure for imported commodities in Malaysia.

However, it was observed that the structure of imported commodities obtained from the special survey was similar to those compiled from the above-mentioned sources in Paragraph 2.5. A study was undertaken to ascertain the structure of imported

commodities for the agriculture, mining, and services sectors through administrative means and discussion with the agencies concerned.

i) Data Sources

In estimating the imported commodities for Input-Output determination, three sources were combined to produce the import matrix. They are:

a) Survey on Usage of Imported Commodities

Information on percentage of usage of imported commodities by three main user industries (categorized by HS code) was obtained from the questionnaires of a survey conducted specifically for this purpose.

b) Trade Statistics

The values of imports by commodity to nine digits of HS 9 and by country for the year 2000 were obtained from the trade statistics compiled by DOSM. The total import value for Malaysia for 2000 was RM311,459 million.

c) Annual Survey of Manufacturing Industries

Information on imported raw materials for the manufacturing sector was extracted from the annual survey. The total imported raw materials for the manufacturing sector in for 2000 was RM127,341 million. The results of this survey were matched against the findings of the special survey to arrive at reasonable values for each commodity.

ii) Estimation of the Import matrix

The import matrix for 2000 was constructed based on the information obtained from the three data sources mentioned earlier. Since the response rate of the survey is only moderate, other information from economic surveys carried out by DOSM was utilized in order to get a more accurate import matrix. The steps used to construct the import matrix are as in Appendix 1.

iii) Import matrix and export vector by country

The import matrix is further desegregated into import matrices by country of origin. Estimations were made by multiplying the total import matrix by the ratio of imported commodities by AIO and by country.

The export vector is desegregated into export vectors by country of destination. Estimations are made by multiplying the total export vector by the ratio of exported commodities by AIO and by country.

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

The available data on these margins are those provided by the surveys of distributive trade, railways, port authorities, forwarding agents, as well as lorry, bus, and taxi transport.

The surveys provide data on gross trade margins separately for wholesale and retail trade. Gross trade plus transport margins have also been calculated for locally produced and imported goods in cases where both producer and purchaser prices could be extracted from the statistics. Further breakdown by trade and transport margins was done by estimating the rates of margins for each commodity. The rates have been used for calculation of the market or purchaser values of the supplies for comparison with recorded demand and for estimation of the demand for these services by each user.

3.2 Import duties and import commodity taxes

The import duty and commodity tax values in total were obtained from the Royal Malaysian Customs Department. Import duties were calculated for each article and allocated to users at CIF values, following the guidelines provided in the Malaysian Trade Classification and Customs Duties Order by the Royal Malaysian Customs Department. There are two categories of import duties imposed: (i) Goods imported from ASEAN countries are eligible for benefit from Common Effective Preferential Tariff (CEPT), where the rates of import duties are lower, and (ii) import duty rates for goods imported from other countries vary according to the type of imported goods.

The commodity taxes are accordingly classified by commodity group and allocated to users in the same proportion as the commodity subgroups at basic prices.

3.3 International freight and insurance

Data collection on freight and insurance on imports is required for the compilation of the Asia-Pacific Trade Matrix for the year 2000. Therefore, the estimation of freight and insurance was done as follows:

i) Data Sources

The sources of data used are primary and secondary data. Primary data were compiled directly from the sample survey and was used to obtain import matrices. While, the secondary data were gathered from the customs declaration forms for the purpose of estimating freight and insurance.

In order to estimate freight and insurance for Malaysia, customs declaration forms submitted by traders, particularly importers, were being used. From these forms, detailed information on commodities such as total imports; commodity codes based on the Harmonized Commodity Description and Coding System (HS); values for cost, insurance, and freight (CIF); import duties; quantities; and countries of origin could be obtained. The values for insurance and freight by commodity were estimated separately, as explained below.

ii) Coverage

The period of coverage used for the compilation of the data was January to December 2000. For the year 2000, there are a total of 3,888,697 customs declaration forms, of which only 38,762 forms (1% of the total) were selected as a representative sampling. Those with value of more than RM1 million were taken into account.

In terms of commodity coverage, there are a total of 7,560 commodity groups in Malaysia. However, from the sample forms chosen, only 1,758 commodity groups were taken into consideration. This covers 23% of total commodities on average.

For the year 2000, the total amount for cost, insurance, and freight (CIF) values is RM312,426.7 million. From the 23% of sample commodities covered, the CIF value is RM124,142.3 million, which represents 40% of total CIF. Therefore, it can be concluded that the sample coverage is sufficient to represent the population as the whole.

iii) Estimation of Insurance and Freight, by Commodity

The values for insurance and freight were estimated, using the Ordinary Least Square model. The model uses a single equation for insurance and thus, freight. In this case, the assumption was that it was an exponential model. The equations to estimate insurance and freight, respectively, are as follows:

$$\ln \text{INS HS,C} = \beta_0 + \beta_1 \ln \text{CIF HS,C} \dots\dots\dots (1)$$

$$\ln \text{FGT HS,C} = \alpha_0 + \alpha_1 \ln \text{CIF HS,C} \dots\dots\dots (2)$$

where,

INS HS,C = insurance by HS code and by country.

FGT HS,C = freight by HS code and by country.

CIF HS,C = sample imported values at CIF values by HS code and by country.

The sample data for CIF values for insurance and freight were regressed to yield parameter values (β_0/α_0 and β_1/α_1), standard error, and adjusted R^2 for each country. The results obtained from the regression were then simulated, using the 2000 import data by country and by commodity, respectively. Thus, the blow-up values for insurance and freight for each of the commodities were derived. Summation of these values accordingly yielded the estimated insurance rates and international freight by country and by AIO sector.

3.4 Employment matrix

Information on the structure and distribution of employment was obtained from the Labour Force Survey (LFS) 2000 conducted by DOSM. However, the result from the Population and Housing Census of Malaysia 2000 was also used for comparison and adjustment to ensure reasonableness. The preference for LFS employment data is mainly due to the fact that LFS is carried out regularly by DOSM-trained personnel, whereas the Census was a massive project conducted once per 10 years. Thus, the results obtained from the LFS are assumed to be more accurate and superior.

LFS for the year 2000 used the old classification (Malaysia Industrial Classification [MIC] 1972), where certain industries do not conform to the MSIC and subsequently to the 76 sectors in AIO. This problem was encountered with AIO 029, 048, and 050.

And example of multiple relationships between the MIC and MSIC is as follows: MIC 35130 Manufacture of synthetic resins, plastic materials, and synthetic fibers except glass is divided into (i) MSIC 24300 Manufacture of synthetic fibers (which is classified in AIO 029) and (ii) MSIC 24130 Manufacture of plastics in primary forms and of synthetic rubber (which is classified in AIO 030). As such, minor adjustment has been made, using data on the percentage of contribution by each industry obtained from the Census. This is because Census used MSIC as the industry classification. The same

proportion from the Census is further used to desegregate the industries in terms of MIC in the LFS. For example, the contribution of MSIC 24300 and MSIC 24130 obtained from the census are 5% and 95%, respectively. Thus, it is assumed that 5% of MIC 35130 will be classified under AIO 029 and 95% under AIO 030.

3.5 Others

i) Direct Purchase Abroad

Direct Purchase Abroad is distributed into the Private Consumption Expenditure column vector and Export column vector, respectively. The distribution is based on the ratio of commodities used for private consumption and export.

ii) Imputed Bank Charges

Imputed Bank Charges are distributed into the Finance and Insurance sector (AIO 068) based on the ratio of finance and insurance services consumed by industries.

4. CODE CONCORDANCE

4.1 Classification

The Malaysia Input-Output Table has 94 sectors, while the AIO has only 76 sectors. Therefore, we adopted the framework and made the sector classification according to the unified sectors set by Japan, in order to enable comparison at the international level.

The framework for Malaysia Input-Output, known as the ISAP-Malaysia Classification of Commodity by Industry (MISAP), follows the National Accounts Industrial Classification (NAIC) 2000, Malaysia Standard Industrial Classification (MSIC) 2000, and Central Product Classification (CPC) Version 1.0. In principle, all the classifications comply with the International Standard Industrial Classification for All Economic Activities (ISIC) Revision 3. The MISAP also has direct links with the first six digits of the Harmonized Commodity Description and Coding System (HS).

4.2 Problems encountered in classification

Differences in definitions of classifications used by Malaysia and Japan have resulted in nonconforming industry classifications. Sectors affected are listed in Appendix 2.

In the case of supply-and-demand values, the problem was solved by tracing from the classifications of commodities produced. For example, NAIC 24014 Other Agriculture is classified under Other Grain (AIO 002), Food Crops (AIO 003) and Nonfood Crops (AIO 004). However after thorough discussion, an assumption was made that the industry would be classified according to its commodities. For example, if a commodity is maize, the supply and demand industry will be classified under Other Grain (AIO 002). If the commodity is sugar cane, the industry will be classified under Food Crops (AIO 003).

However, in the case of the value for compensation of employees (COE), the problem was solved by multiplying the COE at the industry level by the percentage of value added of affected sectors. For instance, the value of COE for Manufacture of Office, Accounting, and Computing Machinery (NAIC 24175) is RM1.4 billion. However, NAIC 24175 is classified into AIO 050 and AIO 052. As such, the value of RM1.4 billion is desegregated into AIO 050 and AIO 052 by using the percentage of value added of each sector, which is 94% for AIO 050 and 6% for AIO 052.

4.3 Difference in MIO and AIO Classification

Unclassified Industry is treated as an exogenous factor in the national I-O instead of endogenous. In addition, the Domestic Services sector in Malaysia Input-Output is classified under Unclassified Industry (AIO 076) for this project.

5. PRACTICAL PROBLEMS AND OTHERS

5.1 Enhancement of certain areas in unified Input-Output

Estimation of trade margin, and insurance and freight are new areas to be addressed for AIO, where there was less experience among the team. In order to have more convincing and current input for these areas, further discussion with the parties involved will be conducted in the future.

5.2 Desegregation of Value Added components

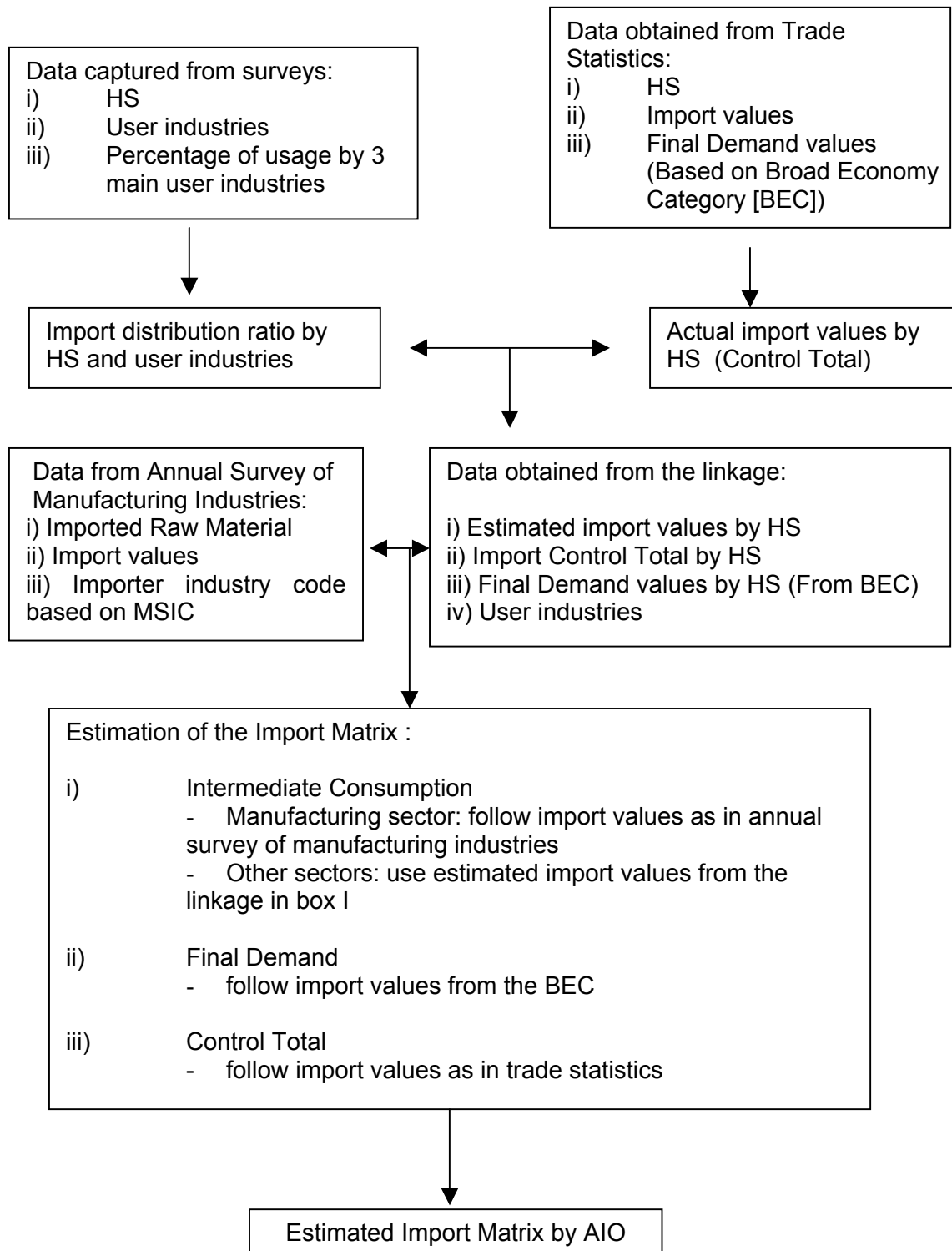
In the 2000 Input-Output tables, value added is presented by two components: compensation of employees and operating surplus. However, an attempt will be made to have value added desegregated into more detailed components.

5.3 Improvement in the skills and expertise

With the increasing demand and participation of the Department in international work, it is our aspiration to increase the expertise, knowledge, and number of personnel in this area. Thus, the Department is currently exposing a few of young personnel into this area of work through training locally and internationally besides involving intensely in the routine and developmental work.

Appendix 1

Steps to Estimate Import Matrix



Appendix 2

Classification Problems

No.	National Account Industrial Classification (NAIC)	Unified Input-Output (AIO)
1.	24014 Other agriculture	002 Other grain 003 Food crops 004 Nonfood crops
2.	24063 Metal ore mining	009 Iron ore 010 Other metallic ore
3.	24129 Spinning and weaving of textiles	018 Spinning 019 Weaving and dyeing
4.	24133 Manufacture of wearing apparel	020 Knitting 021 Wearing apparel
5.	24171 Manufacture of general-purpose machinery	043 Metal products 044 Boilers, engines, and turbines 045 General machinery
6.	24175 Manufacture of office, accounting, and computing machinery	050 Electronic computing equipment 052 Other electronics and its products
7.	24176 Manufacture of electrical machinery and apparatus n.e.c.	048 Heavy electric machinery 054 Lighting fixtures, batteries, wiring, and others

THE PHILIPPINES

I-O Team
National Statistics Office

1. INTRODUCTION

1.1 Brief history of the national I-O table

The 2000 Asian Input-Output (I-O) table is the fifth in the series of international industry accounts constructed for the Philippines in cooperation with the Institute of Developing Economies (IDE), Japan. The main participating agency for this series is the National Statistics Office (NSO). The first Asian Input-Output table constructed for the Philippines was the 1975 International Input-Output Table. This was in cooperation with the University of the Philippines. The second was the 1985 Asian International Input-Output Table, with NSO as the main partner agency of IDE. The third and the fourth Asian I-O tables were for the years 1990 and 1995, with NSO as the agency cooperating with IDE.

The 2000 Asian I-O Table is available from a more aggregated level of 7 by 7 matrix to the most disaggregated level of 76 by 76 matrix.

1.2 Features of the national I-O table

The 2000 I-O table follows the same format as that adopted for the 1985 I-O compilation, wherein distinction is made between commodities and industries. Two intermediate tables (the MAKE and USE matrices) were first compiled before deriving a symmetrical I-O table.

The basic design of the I-O table shows the division of demand or uses of goods and services into two categories: intermediate and final demand. Also, the I-O table shows the classification of inputs into intermediate (or produced) and primary factors of production.

Another feature of the 2000 I-O is the presentation of total import duties as a separate item that is added to the total gross value added by sector to come up with Gross Domestic Product. The concepts of output, intermediate consumption and final demand are the same as those of the national accounts.

There are two versions of the I-O: the competitive-imports type and the non-competitive-imports type, or domestic I-O. The difference between the two is the treatment of imported inputs. In the former, the intermediate inputs contain both domestic and imported components, while in the latter the imported components of intermediate inputs and final expenditures are separated out. Thus, in the non-competitive-imports type I-O all intersectional transactions are for locally produced commodities only.

1.2.1 Sector classification

The existing I-O sector classification is based on the 1994 Philippine Standard Industrial Classification Code (PSIC). I-O codes 001 to 064 are classified as industrial sectors and I-O codes 065 to 075 as nonindustrial sectors.

The 75 I-O sector classification has the following composition: 7 classifications for Agriculture, Forestry, and Fishing; 4 for Mining and Quarrying; 49 for Manufacturing; 2 for Electricity, Gas, and Water; 2 for Construction; 1 for Wholesale and Retail Trade; 2 for Transport, Storage, and Communications; 1 for Financial Intermediation; 1 for Real Estate, Renting and Business Activities; and 6 for the Service Sector.

1.2.2 Valuation

The I-O table is valued at both producers' and purchasers' prices, and at the same time a trade and transport margin table is generated. However, tables are always presented in producers' prices, as they adopt the generally accepted premise that this valuation scheme yields coefficients that are likely to be more stable than those valued under the purchasers' price system.

The MAKE matrix is valued at the current producer's price and was derived based on gross output. The USE matrix is valued at the purchaser's price and was derived based on

gross input. Export is valued at FOB (Free on Board), while Import is at CIF (Cost, Insurance, and Freight).

Valuation is in U.S. dollars. All tables in local currency were multiplied by the exchange rate taken from the IMF Financial Report.

2. ESTIMATION WORK

2.1 Control Totals (CT)

Estimation of control totals was a joint work of NSO and the National Statistical Coordination Board (NSCB). NSO was in charge of the organized sectors, while the NSCB works on the unorganized sectors. The latter was tasked to consolidate and finalize the control totals (CT). They also harmonized the I-O totals with the National Account levels (published).

In this project, a preliminary CT was derived at 75 I-O levels from the published annual National Accounts (NA) for major sectors from NSCB. Detailed CT for 75 I-O sectors were derived from application of the results of the Input-Output Survey of Philippine Business and Industry (IOSPBI), Census of Philippine Business and Industry (CPBI), and Labor Force Survey (LFS) to the aggregated totals.

2.1.1 Estimation of control totals for organized sectors

Control totals for Value of Output/Revenue, Cost, and Change in Inventory were estimated based on 2000 CPBI.

Value of Output was estimated for the sectors Agriculture, Hunting, and Forestry (A); Fishing (B); Mining and Quarrying (C); Manufacturing (D); Electricity, Gas, and Water (E); and Construction (F). Revenue was estimated for the sectors Wholesale and Retail Trade (G); Hotels and Restaurants (H); Transport, Storage, and Communication (I); Financial Intermediation (J); Real Estate, Renting, and Business Activities (K); Private Education (M); Health and Social Work (N); and Other Services (O).

Value of Output at 3-digit PSIC for sectors C, D, E, and F was readily available in CPBI. However, for sectors A and B, Value of Output was not generated. An estimate of Value of Output at 3-digit Philippine Standard Industrial Classification (PSIC) was computed as the sum of sales, change in inventory, and sales of goods less cost of goods sold plus ending inventory of goods for resale. Value of Output at 4- and 5-digit PSIC for establishments with Average Total Employment (ATE) 20 OR MORE was estimated using the structure of Revenue at 4- and 5-digit PSIC. For establishments with ATE LESS THAN 20, Value of Output at 3-, 4-, and 5-digit PSIC was estimated, using the structure of the ratio of Value of Output to Revenue at 3-, 4-, and 5-digit PSIC in establishments with ATE 20 OR MORE. However, for establishments with ATE LESS THAN 20 without Value of Output and Revenue at 3-, 4-, and 5-digit PSIC in establishments with ATE 20 OR MORE, Value of Output was estimated based on production per employee data from IOSPBI. If employment data were not available in IOSPBI, Average Total Employment data from the List of Establishments (LE) were used. The assumption is that production per employee within the industry is the same.

Cost and Change in Inventory at 3-, 4-, and 5-digit PSIC for establishments with ATE 20 OR MORE and ATE LESS THAN 20 were estimated based on readily available figures for all sectors. However, Cost at 5-digit PSIC for establishments with ATE LESS THAN 20 was estimated using structure of revenue at 5-digit PSIC.

2.1.2 Estimation of control totals for unorganized sectors

Value of Output at 3-, 4-, and 5-digit PSIC was estimated based on income data at 2-digit PSIC from the Family Income and Expenditures Survey (FIES) and structure of unorganized sector employment at 3-, 4-, and 5-digit PSIC from the Labor Force Survey (LFS).

2.1.3 Adjustment of control totals based on GVA growth rate

Control totals for the I-O sectors Paddy (001), Other Grains (002), Livestock and Poultry (005), Forestry (006), Fishery (007), Crude Petroleum and Natural Gas (008), Other Metallic Ore (010), Milled Grain and Flour (012), Fish Products (013), Slaughtering and Meat Products (014), Spinning (018), Weaving and Dyeing (019), Knitting (020), Wearing

Apparel (021), Other Made-Up Textile Products (022), Timber (024), Semiconductors and Integrated Circuits (051), Motor Vehicles (055), Building Construction (063), Other Construction (064), Real Estate (069), and Public Administration (075) were lower than the 1994 figures. Hence, adjustments were made based on Gross Value Added (GVA) growth rate. However, 1994 GVA for some AIO classifications was not available. Hence, an estimate of 1994 GVA was computed, using the structure of ratio of 2000 GVA for AIO classification to 2000 GVA for Industry Group.

2.2 Final Demand

Personal Consumption Expenditures (PCE) refers to the expenditures of households and nonprofit institutions. This was estimated from FIES. PCE value is the value of final expenditure on goods and services of households. Family expenditure items from FIES were classified to correspond to 1994 PSIC code and then to 75 I-O code. Other disbursement items in FIES were not considered as Personal Consumption Expenditures. These are purchase or amortization of real property, payments for cash loans, installments for appliances and transport bought before 2000, loans granted to persons outside the household, amounts deposited in banks, major and minor repairs, or construction of a house.

Government Consumption Expenditures (GCE) is the current operational expenditures of the government for commodities and services. The basic sources of data were the following: the Department of Budget and Management (DBM), Commission on Audit (COA), and Department of Finance (DOF). Estimates from administrative records were derived.

Gross Fixed Capital Formation (GFCF) includes the fixed investment expenditures of the government and private sector. This also includes durable equipment by commodity, construction and breeding stocks/orchard development estimated from data from CPBI, National Accounts (NA), administrative records from COA, and the Cost of Production Survey from the Bureau of Agricultural Statistics (BAS). The main source of data is the CPBI (capital expenditures).

Change in Stocks (CS) was estimated from data from CPBI and NA. This is the difference between ending and beginning inventories.

Exports include merchandise, nonfactor services, and international tourism expenditures estimated from Foreign Trade Statistics (FTS), NA, and administrative records from Bangko Sentral ng Pilipinas (BSP).

Imports include merchandise, nonfactor services, and international tourism expenditures, as well as customs duties and taxes, estimated from FTS, NA, and administrative records from BSP. Direct purchases by nonresidents were also estimated and included.

2.3 Value Added

Value-added items include compensation, taxes less subsidies, depreciation, and operating surplus. Compensation (refers to the salaries and wages paid by the industries in the process of production), indirect taxes (taxes involved in the production process; examples: business tax, sales tax, VAT, etc.) less subsidies (refer to special grants in the form of financial assistance or tax exemption or tax privilege received from the government to aid and develop an industry; examples: tax credits, tax and duty exemptions) and depreciation (refer to the value of wear and tear of fixed assets) were derived from CPBI and NA. Operating surplus or other value added was computed by taking the residual of Value Added less compensation, indirect taxes net of subsidies, and depreciation.

2.4 Intermediate Transactions

Output and input structure at 75 I-O sector were estimated from the results of the 2002 IOSPBI.

The output structure table shows the distribution of production/revenue at the I-O level (75 classifications). The input structure table shows the distribution of total costs of materials, fuel, and supplies at the I-O level (75 classifications). Value of input for a certain commodity of industries in all sectors is estimated as the sum of cost of materials and supplies, fuels and lubricants, electricity and water, and industrial and nonindustrial

services. Estimate of value of input for a certain commodity of industries in sector A also includes seeds, seedlings, young animals and fowl, and agricultural or forestry services. Industries in sector B also include fishery services in the estimate of value of input for a certain commodity. Estimate of value of input for a certain commodity of industries in sectors K also includes real estate purchased for sale.

2.4.1 Conduct of 2002 IOSPBI

<Objectives>

The main objective of the 2002 IOSPBI is to provide a comprehensive body of statistical information required for the compilation of the 2000 Benchmark Input-Output Accounts of the Philippines. Specifically, the survey aims to collect detailed information on revenue, production, cost, and inventories of businesses and industries in the country.

<Sampling Design and Selection>

The 2002 IOSPBI samples were a subset of samples of the 2002 Annual Survey of Philippine Business and Industry (ASPBI). The industry domains used were the same as those of the ASPBI. They covered a sample of about 5,590 establishments. These represented the 229 industry groups comprising the whole economy as envisioned in the 2000 Interindustry (Input-Output) Accounts.

The 2002 IOSPBI covered all establishments for the sectors Agriculture and Forestry; Fishing; Mining and Quarrying; Manufacturing; Electricity, Gas and Water; Construction; Hotels and Restaurants; and Bank and Nonbank Financial Intermediation. The sectors Wholesale and Retail Trade and Repair of Motor Vehicles, Motorcycles and Personal and Household Goods excluded sari-sari stores, establishments with no regularly paid employees, and open stalls in public markets. The Transport, Storage, and Communication sector excluded operators of tricycles, jeepneys, calesas, and pedicabs; government postal and telegraphic offices; and booking offices of foreign airlines. The sector Real Estate, Renting, and Business Activities excluded establishments engaged in letting and operating real estate such as residential and nonresidential buildings and land rentals. The education sector excluded establishments engaged in public education. The Health and Social Work sector excluded establishments engaged in public medical, dental, and other

health services. Other Community, Social, and Personal Service Activities excluded establishments with activities of membership organizations, n.e.c.

<Questionnaire Design/Content>

The 2002 IOSPBI used eight different types of questionnaires: ASPBI FORM No. 4.1 (Agriculture, Forestry and Fishery), ASPBI FORM No. 4.2 (Manufacturing, Mining and Quarrying), ASPBI FORM No. 4.3 (Electricity, Gas and Water), SPBI FORM No. 4.4 (Construction), ASPBI FORM No. 4.5 (Wholesale and Retail Trade), ASPBI FORM No. 4.6 (Real Estate), ASPBI FORM No. 4.7 (Transport, Storage and Communication, and Financial Intermediation), and ASPBI FORM No. 4.8 (Hotels and Restaurants; Education; Health and Social Work; Other Community, Social, and Personal Service Activities; Other Business Activities; and Repair Services).

Each type of questionnaire contained four data items: Economic Activity, Revenue/Production, Costs, and Inventories.

<Collection of Completed Questionnaires>

Collection of completed questionnaires started as early as September 2002. After the deadline, all efforts to collect the completed questionnaires were still exerted. Follow-ups of uncollected questionnaires were also done by Central Office staff.

As of February 20, 2004, a total 4,717 questionnaires were received, representing 84 percent of the total questionnaires delivered. Of this, only 3,386 were found “good” for processing. The remainder were found closed or could not be located (805), referred to and transferred to a new location (171), or were otherwise unusable for reasons such as being duplicates, having no response or no entry, or refusal (355).

<Manual and Machine Processing of Questionnaires>

Initially, manual processing of IOSPBI questionnaires involved field editing, which was done at the field offices upon collection of questionnaires. Edited 2002 IOSPBI questionnaires were transmitted to the Central Office in accordance with the set deadlines. The Central Office staff prepared reports on the status of receipt of questionnaires.

Machine processing was done at the Central Office. It was microcomputer-based, using the Census Survey Processing System (CSPPro), and includes data encoding, machine editing, and generation of statistical tables. The machine processing system developed by the Information Technology Systems and Research Division (ITSRD) of the Information Resources Department (IRD) was primarily used for data entry, machine validation, and the generation of various tables.

The Economic Indices and Indicators Division (EIID) of the Industry and Trade Statistics Department (ITSD) was responsible for the second stage of manual processing and machine processing of the completed questionnaires.

2.5 Import Matrix

The import matrix was compiled as a supporting table. It shows the distribution of imported commodities among the various sectors that use it. With the availability of the import matrix, it is possible to distinguish between the locally produced and imported components of each cell entry in the transactions table. The I-O table for the noncompetitive imports type is derived by subtracting the Imports table from the Main Transactions table. This type of table is most useful in I-O analysis of the economic structure as well as in determining import requirements by industry.

The first step in the compilation of the imports table was the estimation of control totals for each commodity sector. For merchandise imports, the basic data were obtained from the FTS of NSO valued either in CIF or FOB. Nonmerchandise imports (services) were taken from the Balance of Payments (BOP) of BSP. This column vector of commodity imports, which appears in the main transaction table as negative entries, served as the control totals in the allocation process of the import matrix. Valuation of this column vector is in CIF.

The construction of the 2000 import matrix was done by combining the direct and indirect method. The direct method was taken from the FTS.

From the FTS data, the merchandise import matrix was generated. Each trader was provided a corresponding PSIC. This PSIC was converted to an I-O code and now represented the industry at the I-O level. On the other hand, the corresponding PSCC was also converted to an I-O code. An import absorption matrix was generated for commodities by industry. The table was checked against the total absorption matrix. If the cell in the import matrix was greater than the cell in total absorption matrix, the value from the cell of total absorption replaced the value in the cell of the import matrix.

Another method used for generating an import matrix was the indirect method. This method assumed the imported component of intersectoral transactions to be proportional to domestic demand. The estimate of the import content of a commodity (row) consumed by an industrial sector (column) was equated as the value of the commodity (row) consumed by the industry (column) divided by total domestic demand for the commodity, and multiplied by control total for import value.

2.5.1 Division of total import matrix by country of origin

An import matrix by country of origin was generated, following the same procedure as for the construction of the total import matrix using the direct method. This was done for each country (a total of 15 countries) included in the Asian I-O Table. The total import matrix for the AIO will be the sum of the import matrices for the 15 countries.

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

Data on transport margins were taken from the Domestic Trade Statistics, Commodity Flow of the Philippines by region, by 5-digit PSCC, and by port. Trade margins, however, were taken from the results of the establishment survey, particularly for Wholesale and Retail Trade (Sector G). The output of the trade sector was measured according to the gross trade margin. The gross trade margin was estimated to be equal to the difference between receipts from reselling and cost of goods resold less estimated transport costs. It is also the difference between what was received by producers and paid by purchasers,

exclusive of transport or freight costs.

The matrix of trade margins was constructed by multiplying the value at purchaser's price by trade mark-up rates.

The matrix of transport charges was built following the same methodology used in the preparation of trade margin tables.

In the preparation of the trade margins and transport charges, the following criteria/assumptions were used:

1. Each commodity transaction in the I-O table at purchasers' price is presumed to be solely a transaction between producer and wholesaler, except for goods consumed by households and assumed to have been purchased from retailers who obtained them from wholesalers. Thus, only wholesale trade mark-up is charged on interindustry transactions, while both wholesale and retail trade mark-ups are applied to household transactions.
2. Trade mark-ups are charged only to commodity transactions that pass through domestic trade channels. Hence, identified direct purchases by producers from abroad (imports) are charged only local transportation costs.
3. No distribution costs are charged to commodity stocks (inventories).
4. Uniform mark-up rates are charged to both domestic and imported purchases.

3.2 Import duties

The rates of import duties were collected from the Tariff Commission. The available tariff rates at HS 8-digit level were utilized. The data were further processed to generate import duties at the I-O level.

3.3 International freight and insurance

The Philippines has a comprehensive compilation of FTS. Import and export data for 2000 by commodity and by country are readily available. The following steps were followed in the compilation for trade sectors and estimation of insurance and freight rates:

1. Completion of the various reference files and finalization the PSCC-HS-PIO-AIO code concordance
2. Development of a matching program. This was tested and run with the use of the various reference files built by the system.
3. Preparation of a tabulation program that would generate the following tables:
 - a. Import value (CIF) by country of origin at the I-O level (in thousands of U.S. dollars)
 - b. Export value (FOB) by country of destination at the I-O level (in thousands of U.S. dollars)
 - c. Insurance and Freight value by country of origin at the I-O level (in thousands of U.S. dollars)
4. Computation of the insurance and freight rates, using the following formula:

$$\text{IF rate} = \text{IF value} / \text{CIF value}$$

Where: IF is Insurance and Freight Values

CIF is Cost, Insurance, and Freight that is equal to

Free on Board (FOB) value + Insurance + Freight
5. Generation of the Insurance and Freight Rates by country of origin at the AIO level (in percent)
6. Review of all tables generated. Each table was reviewed and verified. The totals per country were checked against compiled data both for import and export.
7. Finalization of all the tables and submission to IDE in Japan for completion of the first-year project

3.4 Employment matrix

The employment data in 2-digit industry classification by class of worker from the 2000 Labor Force Survey (LFS) were utilized as the control totals in the estimation of employment in the 75 I-O sectors and employment status.

For I-O sector classification with corresponding 3-digit industrial classification, estimates of employment data were based on the structure of the 3-digit employment data by class of worker from the 2001 LFS. In the 2001 LFS, class of worker (employment status) was categorized as private household, private establishment, government corporation, self-

employed, with pay, employer, and without pay. The categories “private household,” “private establishment,” and “government corporation,” were referred to as “employee” in the I-O table. The categories “self-employed,” “with pay,” and “employer” were referred to as “own-account worker” in the I-O table. The category “without pay” was referred to as “unpaid family worker” in the I-O tables.

For I-O sector classifications with corresponding 4- and 5-digit industrial classifications, estimates of employment data were based on the structure of the 4- and 5-digit employment data by type of employee (paid employees and unpaid employees) from the 2000 CPBI. The structure of the 4- and 5-digit data on paid employees was used to estimate employment for the category “employee” under employment status. The structure of the 4- and 5-digit data on unpaid employees was used to estimate employment for the categories “own-account worker” and “unpaid family worker” under employment status.

4. CODE CONCORDANCE

The making of code concordance was the first step in this project. The code concordance was initiated in FY 2001 and finalized in FY 2002.

The first step was the generation of the classification codes with descriptions, such as the Philippine Standard Commodity Classification (PSCC), Harmonized System (HS), Philippine Input-Output (PIO), and Asian International Input-Output (AIO).

The existing PSCC conversion to HS was reviewed. Then each HS code with the corresponding description was matched one on one with the PIO code and its corresponding description. The HS codes were very closely scrutinized (based on description) before making the decision on which PIO code should be included. A list of AIO codes was provided by IDE and reviewed by NSO. Each description of PIO code was matched one on one with the AIO code. It was then ascertained to which AIO code a particular PIO code should correspond.

4.1 Findings in matching of PIO code to AIO code

1. PIO 15 and 16 (Coffee and Cacao) were initially matched with AIO 15 (Other Food Products). They were later transferred to AIO 3 (Food Crops) upon the suggestion from the IDE expert.

2. PIO 40 (Milk Processing), 41 (Butter & Cheese), and 43 (Other Dairy Products) were matched with AIO 15 (Other Food Crops). However, on the Japanese side they were matched with AIO 14 (Slaughtering and Meat Products). After some discussions with the Japanese expert it was decided that they would be matched with AIO 14. The reason for this is that the raw material used in processing these products came from the activities of AIO 14.

3. PIO 57 (Manufacture of Ice) was included in AIO 16 (Beverages).

4. PIO 69 (Textile Spinning, Weaving, Texturing, and Finishing) was further split into PIO 69A (Spinning) and PIO 69B (Weaving, Texturing and Finishing) so they will have one-on-one correspondence with AIO 18 (Spinning) and AIO 19 (Weaving and Dyeing). The splitting of the code was done by identifying the industry codes that could be categorized as for Spinning and as for Weaving, Texturing, and Finishing.

5. Initially there was no corresponding timber sector in the PIO code. After a thorough review, PIO 85 (Sawmills and Planing Mills) was matched with AIO 24 (Timber).

6. PIO 139 was split into 139A (Manufacture of Engines and Turbines Excluding for Transport Equipment) and 139B (Manufacture of Special Industrial Machinery and Equipment) by identifying the industry codes that could be categorized as for Manufacture of Engines and Turbines Excluding for Transport Equipment and as for Manufacture of Special Industrial Machinery and Equipment.

7. PIO 140 (Manufacture, Assembly and Repair of Office, Computing and Accounting Machines) was further broken down into PIO 140A (Office Machinery) and PIO 140B (Computers, Electronic Data-Processing Parts, and Accessories) by identifying the

industry codes that could be categorized as for Office Machinery and as for Computers, Electronic Data-Processing Parts, and Accessories. Their corresponding AIO codes are AIO52 (Other Electronics and its Products) and AIO50 (Electric Computing Equipment).

8. On the Japanese side, Construction was classified into two separate AIO codes. These are AIO63 (Building Construction) and AIO64 (Other Construction). On the Philippine side, PIO 170 (Construction) was also further broken down into PIO 170A (Building construction) and PIO 170B (Other Construction) by identifying the industry codes that could be categorized as for Building Construction and as for Other Construction.

5. PRACTICAL PROBLEMS

5.1 Problems encountered in the collection of IOSPBI questionnaires

Numerous problems were encountered during the field operations, some of which are the following:

1. Transmittal of completed IOSPBI questionnaires was delayed because of provincial processing of 2002 ASPBI. Some provinces did not transmit the questionnaires, because they waited until the corresponding ASPBI questionnaires were processed at the provincial offices.
2. There were some establishments that were already closed but still included in the listing. These establishments were ultimately replaced during the field operations.
3. Some establishments refused to answer the questionnaire because of the detailed requirements. They found it difficult to provide details on the data items. Estimates however, were acceptable.
4. Some establishments pointed out that the survey was conducted when they were busy preparing other reports.
5. Some respondents who were also sampled in the other rider surveys refused to answer the IOSPBI questionnaire because of respondent fatigue.
6. Despite the instructions and definitions printed on the questionnaires, other establishments misinterpreted the questions and failed to provide the correct information.

7. Most of the time, questionnaires were just left with the security guard of a sample establishment, and there was no rapport with the contact person. Thus, necessary callback was made in order to elicit the desired information.

5.2 Problems encountered in the manual processing of questionnaires

1. Some questionnaires did not have detailed information on products. Some provided only the company's own code for each product.
2. Some sample establishments provided product descriptions that were not specific and accurate, sometimes written in abbreviated form, especially reports on raw materials.
3. Other questionnaires did not have breakdowns of raw materials used. Instead, a typical remark was, "Materials are received on consignment."
4. Some questionnaires had no detailed information on the cost of office supplies, nondurable goods, and packaging materials. What was given were estimates in percent.
5. Some samples provided detailed information on the products they produced but no detailed information on inventories.
6. Some provided unit prices of the products sold. Others also included cost of electricity and water in the raw-materials portion of the questionnaires.
7. Some samples did not have information on the products/services of the establishments. Only total value for revenue/production, costs, and inventories were provided. Others provided detailed lists of products and services, with no breakdown of the total value of production/revenue, cost, and inventory corresponding to the products listed given.

These problems were further verified with the sample establishments. These establishments were contacted to obtain detailed information on their products, accurate product descriptions, and breakdowns of the total values of production/revenue, costs, and inventories of materials, fuel, and supplies. Estimations were made on feasibility of obtaining the breakdowns of the total values of production/revenue, costs, and inventories of materials, fuel, and supplies of the sample establishments. Estimates were computed using the percentage distribution of production/revenue, cost, and inventory of these materials obtained from other sample establishments with the same economic activity.

5.3 Problems encountered in the machine processing of questionnaires

1. There were cases in which the entries on a questionnaire exceeded the maximum allowed number of records designed for data entry. The maximum allowed number of records by subgroup (records with subtotal) is only twenty (20). In such a case, the maximum number of records corresponding to the item in question on the questionnaire was adjusted.
2. In the beginning of data entry, there was no consistency check for subtotals and their details, since a subtotal was one of the data items being encoded, and only the totals were automatically calculated by the system. However, in the latter part of the machine processing, error messages indicating that details may not add up to subtotals were considered in the batch edit tables for verification.
3. During tabulation some errors were encountered in reading data files (i.e., filenames assigned in lowercase for sector classification were not considered). The system programmer further verified these tabulation errors and instituted corrections.
4. There was no machine validation for the encoded 1994 PSIC codes for the sample establishments. Errors in encoding resulted to incorrect industry codes or nonexistent 1994 PSIC codes. To correct this error, the encoded 1994 PSIC codes were verified manually, using the 1994 PSIC codebook after the generation of preliminary tables.

5.4 Problems encountered in the construction of the Import Matrix

1. Duplicates and triplicates were encountered in the review of the 2000 Traders Reference File. There were multiple establishments with common trader's codes, names, or addresses. Given this problem, the following procedures were applied to clean up of the 2000 Traders Reference File:

Case 1. Establishments with the same trader's code

The trader's name was verified and if proved to be duplicates or triplicates, the trader's name(s) with higher record number(s) was/were deleted, and the trader's name with the lowest record number was retained. Otherwise, the trader's name with higher record number(s) was/were recoded.

Case 2. Establishments with the same trader's name

The trader's code was verified and if proved to be duplicates, the trader's code with

higher record number was deleted, and the trader's code with lower record number was retained.

Case 3. Establishments with same the trader's address

The trader's name and trader's code were verified and if proved to be duplicates or triplicates, the trader's name/code with higher record number(s) was/were deleted, and the trader's name/code with lower record number was retained.

2. There were new commodities in 2000 that were not included in the existing PSSC-IO reference file. This reference file was updated, and new commodities in 2000 were then added to this file.

3. Unidentified or unspecified trader's names that could not be linked to particular economic activities and were coded as 999. These were classified as other activities, not elsewhere classified.

4. There were trader's names that appeared as names of persons (e.g., Juan de la Cruz) and were coded as 888. These were classified under Personal Consumption Expenditure (PCE).

5.5 Problems encountered during the matching of HS code to PIO code

The common problem was deciding to which category a certain description of the HS code would belong, whether it was a raw material or a manufactured product. It took time to decide on the proper classifications of these materials/products. Example: The description was raw, chilled, and frozen, which is commonly found among the various fish products; rough, surfaced, and dried wood (common among wood product); flowers, seeds (dried), and the like (agricultural products). In such cases, the commodity description was carefully examined. If the description gave information that the commodity underwent some change or transformation, then that commodity was categorized as a manufactured one. Otherwise, it was considered as raw and may be included under agricultural crops, forestry products, and/or fishing products.

SINGAPORE

CHOW Kit Boey
LEE Kee Beng
ONG Chin Huat
CHAN Cheong Chiam
Raymond HENG Wee Chye¹

1. INTRODUCTION

1.1 Brief History of the national I-O tables

A total of 13 input-output tables have been compiled for Singapore since the mid-1960s (Table 1). The first input-output table on the Singapore economy in 1967 was constructed by Dr. Chua Wee Meng for his doctoral thesis. It covered 44 sectors and was valued at purchasers' prices. Two input-output tables were compiled for the year 1972 by the Economic Research Centre (ERC) of the University of Singapore, which was the predecessor of the National University of Singapore (NUS). Both were at purchasers' prices and each contained 58 sectors. One was based solely on published data and information and was a joint project with the Institute of Developing Economies (IDE). The other contained unpublished data from Singapore's Department of Statistics (DOS) and was prepared for the Development Division of Singapore.²

The first official input-output table that was published was compiled by the Department of Statistics and pertained to the year 1973. The table, at basic values, contained 74 sectors. Subsequently three benchmark tables were constructed every five years. The size of the tables increased to 150 sectors for 1978 and 175 sectors for 1983, and decreased to 173 sectors for 1988. An updated table for 1990 was produced. The latest benchmark table covers 1995 and contains 155 sectors. It was released in early 2003.

¹Ms Chow Kit Boey, formerly an associate professor in the National University of Singapore, is now senior fellow, IP Academy, Singapore and director, Business Research Consultants. Dr Lee Kee Beng is an adjunct associate professor, Singapore Management University. Mr Ong Chin Huat is formerly a project manager, NUS Consulting. Mr Chan Cheong Chiam is managing director, Web ilite Technology. And Mr Raymond Heng Wee Chye is formerly a student assistant.

²The Division later became a ministry.

Based on the official tables, NUS and IDE jointly produced four updated tables for the years 1975, 1985, 1990, and 1995. The table for 2000 is the fifth update exercise.

Table 1: Singapore I-O Tables

Year	# Sectors	Valuation	Compiler
1967	44	Purchaser Price	Chua W M
1972[2]	58	Purchaser Price	ERC, ERC-IDE
1973	74	Basic Value	DOS
1975	58	Purchaser Price	IDE-NUS(Update)
1978	150	Basic Value	DOS
1983	175	Basic Value	DOS
1985	175	Basic Value	IDE-NUS(Update)
1988	173	Basic Value	DOS
1990	173	Basic Value	IDE-NUS(Update)
1990	173	Basic Value	DOS (Update)
1995	173	Basic Value	IDE-NUS(Update)
1995	155	Basic Value	DOS

1.2 Features of the national I-O table

The I-O Table for 2000 is based on the official 1995 I-O table released in the first quarter of 2003. Valued at basic prices, the table consists of 155 sectors, a reduction of 18 sectors from the earlier tables. Briefly, compared with the previous benchmark table of 1988, the 1995 table comprises the following (details are shown in Appendix A):

- (a) 76 sectors that are virtually unchanged
- (b) 41 sectors that are changed in terms of scope of commodities or services
- (c) 23 sectors that are consolidated from related sectors
- (d) 15 sectors that are new
- (e) 1 sector that has been disaggregated and distributed to 3 other sectors.

The new sectors are:

- (i) Food chemicals & additives
- (ii) Polymers & synthetic fibers
- (iii) Petrochemicals & products

- (iv) Metal precision components
- (v) Disk drives
- (vi) Semiconductors
- (vii) Electron tubes
- (viii) Other electronic products
- (ix) Mattresses
- (x) Support services for water transport
- (xi) Support services for air transport
- (xii) Airport operation services
- (xiii) Other freight transport
- (xiv) Sightseeing & tourism
- (xv) Information technology

The sector that has been distributed to three existing sectors is signs & displays.

The sectoral representation of the 155 sectors is as follows:

- 5 from agriculture
- 1 from mining
- 99 from manufacturing
- 3 from utilities
- 2 from construction
- 3 from commerce
- 14 from transport & communications
- 4 from finance & insurance
- 11 from business services
- 1 from government
- 12 from social and community services (including ownership of dwellings).

2. ESTIMATION WORK

The project started with collection of trade data by SITC (Standard International Trade Classification) code corresponding to input-output sectors of the Singapore I-O Table 1990 and by economy (ten economies) and region (one regional grouping: the 15 EC countries). Estimation of freight and insurance was the second step, followed by

estimation of control totals for the national table update. After updating the table to year 2000, it was converted to producer prices from basic values and also to a common format devised by IDE. This stage involved several steps, including distribution of import duties to production sectors, separation of tourism expenditures from private consumption, converting exports at FOB to producer prices, and distributing the imputed bank service charges to eliminate the dummy sector. Domestic export matrices by economy and input-output sector were produced. Retained imports matrices were computed and adjusted to eliminate negative values.

After the release of the official Singapore I-O Table 1995 in the first quarter of 2003, a correspondence table between the sectors of the Singapore I-O Table 1990 and that of the Singapore I-O Table 1995 was compiled. Subsequently, revisions of the correspondence table between 1995 Singapore I-O sectors (SIO) and Asian I-O sectors (AIO) were made. The trade data and control totals were recomputed where necessary to conform to the new 1995 Singapore I-O sector classification.

Computer programs were developed to produce the trade matrix and to convert SIO data to AIO data. A RAS program was reformatted to update Singapore I-O Table 1995 to the year 2000. The exogenous file for running the RAS program was compiled, and control totals were adjusted accordingly.

A noncompetitive import matrix by country was obtained with additional data from the Economic Development Board. A trade-and-transport margin matrix was estimated.

In the final year of estimation work, the following tasks were undertaken:

- (a) Conversion from basic value to producer price
- (b) Revaluation of private consumption expenditure to a national basis by commodity
- (c) Adjustment of exports from FOB value to producer price
- (d) Distribution of imputed bank service charges, thereby removing the dummy IBSC sector
- (e) Compilation of a noncompetitive import matrix.

2.1 Control Totals (CT)

The control totals and value-added components of the intermediate sectors of the I-O were estimated from the *Census of Manufacturing Activities* for manufacturing sectors, from the *Economic Surveys Series* for commerce and services sectors, and from other relevant statistics for the remaining sectors. Operating receipts were adopted as control totals for the sectors except for wholesale and retail trades, government, banks, financial institutions, insurance and nonprofit organizations. For wholesale and retail trades, the gross margin reported in the *Economic Surveys Series* was used as the control total. For the government sector, it was public expenditure reported under public finance in the *Yearbook of Statistics*. For banks and financial institutions, the sums of interest differentials between (1) loans and deposits and (2) commissioned charges were adopted as control totals. The data were taken from the annual report of the Monetary Authority of Singapore. The same source provided data for estimating the control total for the insurance sector, which was the difference between premium payments received and claims paid out by insurance companies. For nonprofit organizations, the operating expenditure from the *Economic Surveys Series* was taken as the control total. As there were no published statistics on operating receipts of establishments in the primary sectors, the growth rates of major agricultural items from the *Yearbook of Statistics* were applied to the previous I-O table to derive the respective control totals.

Moreover, the census and surveys did not cover establishments with fewer than ten and five workers, respectively, and the preliminary control totals needed to be adjusted upwards by a factor. This was based on the ratio between 1995 I-O total input/output and 1995 operating receipts or estimates of output for sectors without operating receipts.

Another type of estimation was done because of the higher level of sector aggregation in the *Census of Manufacturing Activities 2000*. Disaggregation of the sectors was based on 1999 census data on output and/or domestic export values of commodities for the sector.

Again the preliminary estimates of control totals based on sector classification of the 1990 I-O table were adjusted to the new 1995 classification. Further adjustments were necessary for AIO sectors, as detailed in Section 4 of this report.

2.2 Final Demand

Other exogenous data required for updating the I-O table were as follows:

- Final demand comprising private consumption expenditure, government consumption expenditure, gross fixed capital formation, change in stocks, and exports of services
- Imports of services
- Import duties
- Other taxes on products
- Taxes on production
- Imputed bank service charges

These were taken directly or estimated from the national accounts (including the balance of payments) and government tax revenue data from the *Yearbook of Statistics*.

The private consumption expenditure column vector in the official table contained tourists' expenditures in Singapore and excluded expenditures abroad by Singapore residents. The total expenditure of tourists in Singapore was recorded under other goods and services in the retained imports matrix. Following the common framework for PCE definition, estimates were made to separate tourists' expenditure from that of Singapore residents. Detailed data on tourist spending in Singapore were obtained from the Singapore Tourism Board's *Survey on Overseas Visitors' Expenditures*. Based on previous research, detailed shopping expenditures on domestically produced goods and retail trade margins were estimated. The tourist expenditures by commodity were identified by I-O sector and then deducted from the PCE vector and added to the export vector.

As data on Singapore residents' expenditures abroad were not available, no further adjustment could be made to the PCE vector.

2.3 Value Added

The value-added components of the Singapore national I-O table differ in two aspects from those of the Asian I-O table. First, the Asian I-O table separates depreciation expenses from operating surplus, whereas the Singapore I-O table provides data on gross operating surplus. Estimates on depreciation were computed based on the

average fixed assets for the year from available data on fixed assets at the beginning of the year and at the end of the year from the *Census of Manufacturing Activities* for manufacturing sectors, from the *Economic Surveys Series* for the services and commerce sectors, and from the *Public Utilities Board Annual Report*. Consultation with industry experts helped in selection of appropriate rates of depreciation for broad groups of fixed assets.

Data for each I-O sector's total value added and its components (wages and salaries, gross operating surplus, and indirect taxes) were extracted from the same sources as those for control totals.

2.4 Intermediate Transactions (Updating of the I-O Table)

First, the final demand vectors except for domestic exports of goods were estimated, using the 1995 coefficients. Adjustments were made to selected values in the private consumption expenditures and gross fixed capital formation, based on changes between 1995 and 2000 on a more aggregated level than the I-O sectors obtained from the national accounts in the *Yearbook of Statistics*. Further adjustments were made to ensure that total intermediate output for each sector is a positive value.

Prior to running the RAS program, the following two equations must hold:

Value Added + Commodity Tax = Final Demand

Final Demand = Private Consumption Expenditure

+ Government Consumption Expenditure

+ Gross Fixed Capital Formation

+ Change in Stocks

+ Domestic Exports

- Retained Imports

The RAS program was first developed by Mr. Sano of IDE. It was modified by Dr. Lee Kee Beng, because of changes in program languages available at the National University of Singapore. Subsequently the program was adapted for PC use.

After the convergence of the RAS algorithm reached an acceptable discrepancy level of less than 0.003, the final updating adjustments were made. The small discrepancy in each sector column was allocated to other retained imports of goods and services. The

intermediate retained value of that sector was increased by the same amount, while the change in stocks was similarly reduced, keeping intact the magnitude of the sector's control total.

2.5 Import Matrix

Trade data, for nine Asia-Pacific economies and the European Union of 15 countries, were extracted from a CD-ROM obtained from the Singapore Trade Development Board.³ Given the significant entrepot trade conducted by Singapore, the trade data relevant for input-output analysis were domestic exports and retained imports. Data on retained imports were not available and were calculated as the difference between total imports and re-exports, without adjusting for the value added on re-exports. Thus retained import values were underestimated by the markup on imports that were re-exported.

The estimating equations for retained imports were as follows:

$$\text{Retained Imports} = \text{Total Imports} - \text{Re-Exports (at import value)}$$

$$\text{Re-Exports (at import value)} = \text{Re-Exports} - \text{Entrepot Trade Margin}$$

$$\text{Re-Exports} = \text{Total Exports} - \text{Domestic Exports}$$

Therefore, from available trade data:

$$\text{Retained Imports} = \text{Total Imports} - (\text{Total Exports} - \text{Domestic Exports})$$

Negative imports could result because of profit-maximizing behavior of entrepot traders who stocked up at low prices to sell their stocks at high prices. Stocks were built up when the price of the commodity was low. As the price rose, stocks were reduced, and re-exports could exceed total imports. Negative retained imports were adjusted by two methods:

- (i) If the absolute value of retained imports was lower than total imports, the negative value of retained imports was changed to a positive value, and stocks of that commodity group were reduced by the same amount of retained imports.
- (ii) If the absolute value of retained imports exceeded that of total imports, it was assumed that all of total imports were retained and re-exports were taken from stocks.

³ The Board has been renamed International Enterprise Singapore, referred to as I. E. Singapore.

The assumption was based on the relationship that:

$$\text{Total Imports} + \text{Change in Stocks} = \text{Retained Imports} + \text{Re-Exports}$$

Thus,

$$\text{Retained Imports} = \text{Total Imports} - \text{Re-Exports} + \text{Change in Stocks}$$

Another complication arose in estimating retained imports in bilateral trade, as entrepot trade involved three parties. For instance, part of Singapore's imports from Indonesia could be re-exported to the United States. Such data were not available. Negative retained imports could result, based on the above formula, as re-exports to the United States were not part of total imports from the States. Detailed examination of negative retained imports was required. For instance, the retained imports from Indonesia would need to be adjusted downward (because of re-exports to the United States), and retained imports from the United States should be a nonnegative value.

Since the CD-ROM allows for data extraction for up to 10 countries only, three rounds of extraction for each trade code were done. A sample of the trade data template is shown in Appendix B.

After the release of the official 1995 I-O Table, the 1988 sector classification and trade correspondence table were revised in accordance with the 1995 I-O Table. The extracted trade data were adjusted into the new I-O sectors.

As the published Singapore trade data excluded trade with Indonesia, the missing data were obtained from the Indonesian side through the kind cooperation of the Indonesian research team. The data in HS codes were converted by a customized program to SITC codes. Some manual adjustments were made to the codes because of nonuniform code numbers; i.e., some codes were at higher aggregation levels, resulting in mismatching.

Indonesia's exports to Singapore were converted to Singapore imports from Indonesia at CIF values by adding a freight-and-insurance factor, while Indonesia's imports from Singapore were deflated by a freight-and-insurance margin to proxy Singapore exports to Indonesia at FOB values. Singapore's exports were further converted to domestic exports, using overall or Malaysia's proportions of domestic exports in total exports.

Another computer program was developed to link the Indonesian data with the rest of the data, to increase the total trade figures by that for Indonesian trade, and to recompute the Rest of the World figures.

Finally the data were reformatted. Specifically, the database was transposed to conform to IDE's standard format. The data values were converted to U.S. dollars by the average exchange rate in 2000 of S\$1.7239 to US\$1. The trade matrices comprised total exports, total imports, domestic exports, re-exports, and estimated retained imports by SITC code in Singapore dollars, by SIO sector in Singapore dollars, and by AIO sector in U.S. dollars.

The adjustments of the retained import matrix to a noncompetitive format by SIO sector were based on purchased data on imports by manufacturing sector and by country/region from the annual census of manufacturing activities jointly conducted by the Economic Development Board and the Department of Statistics. Additional information was obtained from the freight-and-insurance survey conducted for this AIO project.

The census data were from the section of the survey on source of materials (exclusive of GST). Firms were requested to report the value of "Materials (including packing materials) originated abroad . . . even though purchased through local agents or distributors." The import sources were Malaysia, Indonesia, other ASEAN countries (Brunei, Laos, Myanmar, the Philippines, Thailand, Vietnam, and Cambodia), Japan, Middle East countries, other Asian countries, the U.S.A., EU countries, and other countries.

An IDE program, based on a concept similar to that of the RAS for updating I-O tables, was adopted for refining the matrix obtained from the EDB with additional inputs from the freight-and-insurance survey. Appendix C contains the initial noncompetitive import matrix at aggregated levels.

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

Estimations of trade and transport margins were derived from survey data from the Department of Statistics publications, *Economic Survey Series*. Additional indicative data were obtained from the annual census of manufacturing activities jointly conducted by the Economic Development Board and the Department of Statistics. The manufacturing census data pertained to “Charges paid to other firms for inland transportation of goods and ocean/air/other freight (i) Inward delivery (ii) Outward delivery” under “Other Costs of Production and Disbursements (exclusive of GST).”

Seven sectors were identified to be involved in trade and transport: wholesale and retail trades, freight transport by land, port services, warehousing services, other freight transport, other transport services, and crane and container services. The TTM estimates were in terms of the proportion of trade-and-transport expenditures in total output value.

3.2 Import duties and import commodity taxes

The conversion of the updated Singapore I-O table from basic value to producer price involved several adjustments, one of which was adding commodity taxes to domestic output. The row vector of commodity taxes in the Singapore I-O table comprised three types of taxes: import duties, excise duties, and goods-and-services taxes (GST). Excise duties were applicable to domestic output as well as imports, while all transactions for goods and services (except exports) were subject to GST except when the firm’s annual turnover was below S\$1 million. Singapore’s customs & excise duties in 2000 were levied on four commodities: alcoholic beverages (SIO 22), tobacco (SIO 23), petroleum (SIO 36), and motor vehicles (SIO 92).⁴ Data on customs and excise duties were obtained from the *Yearbook of Statistics* under the public finance section. The first adjustment step was to divide the amount of customs and excise duties between domestic output and retained imports according to the ratio of their control totals.

The duties were then distributed rowwise in the four sectors, excluding negative values of stock changes. The assumption was that the duties were levied in the year of

⁴The “Others” group of customs and excise duties constituted less than 0.3% of total customs and excise duties of S\$1.755 billion in 2000.

production. The column totals for duties were checked, and they were adjusted if they exceeded their respective values for commodity taxes. The balance between the allocated and the adjusted total commodity taxes was added to that of private consumption expenditure, which accounted for the largest share of commodity taxes in Singapore.

3.3 International freight and insurance

Two methods were adopted to obtain estimations of freight and insurance on Singapore imports. First, a mail survey was conducted on a sample of manufacturing firms.⁵ (A copy of the questionnaire is attached as Appendix D. The questionnaire also requested data for estimation of the noncompetitive import matrix.)

Second, the World Bank funded a project that has produced a database on bilateral trade. The source was *Trade and Production Database*, by Alessandro Nicita and Marcelo Olarreaga. A rough indication of the freight-and-insurance margin was obtained from the ratio of Singapore's import value to a trading-partner country's export value. It was noted though that apart from freight and insurance, the difference in values in bilateral trade could be due to the time factor, as well as to undervaluation or overvaluation (because of, for example, tax levies).

Information from the two sources was consolidated to derive a freight-and-insurance matrix, with consultation from some industry experts. Readjustments of the estimates were done following the new the sector classification of the official I-O table of 1995 by the Department of Statistics. A freight-and-insurance matrix by AIO sector and by country of origin for Singapore imports was made in terms of the proportion of freight and insurance in imports valued at CIF.

3.4 Employment matrix

An employment matrix by AIO sector and three types of occupational status (employee, own-account worker, and unpaid family worker) was compiled mainly from reports of the *Economic Surveys Series* and the *Census of Manufacturing Activities*. The

⁵Preliminary inquiries to wholesale and shipping firms revealed the difficulty of identifying freight-and-insurance rates by commodity item through these sources. A literature search also failed to uncover any study modeling freight-and-insurance cost at detailed commodity levels.

manufacturing census no longer covered occupational status. Estimation of occupational status in manufacturing sectors was done from past data.

As the surveys and census did not cover all establishments, estimation of total employment by SIO sector was needed. Aggregated data were obtained from two other sources: the *Yearbook of Statistics* and *Population Census 2000*. The former reported total workforce by occupational status, whereas the latter covered resident workers by occupational status and major economic sector. These two sources provided indications on the missing categories of workers from the manufacturing census and the survey series. Specifically, hawkers and stall-holders were excluded in the catering trade, self-employed taxi drivers were excluded from the transport sector, the Monetary Authority of Singapore and companies under its purview were excluded from the financial and insurance sector, and government and freelance artistes were excluded from the combined sectors of community, social, and personal services.

The categories of occupational status differed between the two main sources of data, and between them and the population census. The manufacturing census classification was workman employees (directly involved in the production process), other employees (working directors, managers, supervisors, engineers, technicians, and clerical staff), working proprietors (proprietors and business partners actively engaged in operations), and unpaid family workers. On the other hand, the survey series classified the workforce in the commerce and services sectors into full-time employees, part-time employees, working proprietors and partners (including directors), and unpaid family workers. The third classification from the population census comprised employees, employers, own-account workers (persons operating either on their own or jointly with other partners a business, trade, or profession, without any paid employees) and contributing family workers.

To reconcile the categories of occupational status from the three main sources of employment data, the broad groupings could be employees (both full-time and part-time), employers (including working proprietors and own-account workers), and unpaid family workers.

3.5 Others

3.5.1 Adjustment of exports from FOB value to Producer Price

Another adjustment required for converting the I-O table to producer price was to revalue exports that were reported in FOB values. The trade-and-transport (TTM) ratios were applied to the exports to derive the TTM values for exported goods. This assumed that TTM for domestic consumption was the same as that for exports, because of absence of data on transport-and-trade margins between factories and ports. The total TTM for each sector's exports was deducted from the export value at FOB to obtain the sector's exports at producer price.

The estimated TTM values were aggregated columnwise to derive the total TTM for exports. These scalar figures were recorded under the export column vector and the row vectors of the TTM, resulting in unchanged control total for exports.

3.5.2 Treatment of the Dummy Sector of Imputed Bank Service Charges

After the I-O table was converted to producer price (including the exports vector), and the private consumption expenditure vector was adjusted to exclude tourists' expenditures, the next step was to remove the dummy IBSC vector. Loans and advances from banks and finance companies to industry and professional and private individuals were obtained from the *Yearbook of Statistics*. The imputed bank service charge amount was distributed rowwise to the sectors according to their proportion of loans and advances. The row vector of net operating surplus was reduced by the amount of imputed bank service charge in each of the column sectors, thereby balancing the table.

4. CODE CONCORDANCE

Owing to the aggregation of several sectors in SIO 95 while their corresponding sectors under AIO were maintained, a AIO-SIO reconciliation was carried out in consultation with IDE as follows, based on analysis of production and trade data between 1995 and 2000:

- **AIO 18: Spinning**
- **AIO 19: Weaving & dyeing**
- **AIO 20: Knitting**

- SIO₉₀ 27: Yarn
- SIO₉₀ 28: Woven fabrics
- SIO₉₀ 29: Knitted fabrics
- SIO₉₅ 24: Yarn & fabrics

Output proportions were applied to split SIO₉₅ 24

- **AIO 24: Timber**
- **AIO 26: Other wooden products**
- SIO₉₀ 37: Sawmilling & wood preserving
- SIO₉₀ 38: Plywood & veneer
- SIO₉₀ 39: Rattan processing
- SIO₉₀ 40: Wooden products for buildings
- SIO₉₀ 41: Other wood & cork products
- SIO₉₅ 31: Wood & wooden products

Trade proportions were applied to split SIO₉₅ 31

- **AIO 55: Motor vehicles**
- **AIO 56: Motor cycles**
- SIO₉₀ 112: Motor vehicles
- SIO₉₀ 113: Motor vehicle bodies & parts
- SIO₉₀ 114: Motor cycles & nonmotorized vehicles
- SIO₉₅ 92: Land Transport equipment

Output proportions were applied to split SIO₉₅ 92

5. CONCLUDING REMARKS

The project work on updating the national I-O table took more time than in previous I-O projects for the following reasons:

- (a) The new sector classification of the official Singapore I-O Table 1995
- (b) The aggregated sectors of the manufacturing census of 2000
- (c) The enlarged European Community of 15 countries.

Prior to the release of the 1995 official table, the project work in the first two years was based on the earlier 173-sector classification. Arising from the new format of the official 1995 table, additional tasks included the following:

- (i) Compilation of a sector-industry-commodity correspondence table for sectors that had been changed between compilation of the 1990 and 1995 I-O tables
- (ii) Adjustment of the collected data (trade, freight and insurance, and control totals) to correspond to the sectors that had been changed.

For efficiency purposes, we proceeded with some tasks pertaining to the compilation of the Asian I-O table before the official 1995 I-O table was released. This had led to duplication of several tasks.

Estimation of retained imports in bilateral trade resulted in negative data for a number of countries and I-O sectors. Adjustments had to be made on a case-by-case basis. Another problem encountered was the unavailability until recently of published data from Singapore on Indonesia trade.

On the whole, the project work has been made more systematic, and improvements have been incorporated in this round of updating the Singapore I-O table. The documentation of the steps forms a good reference source for subsequent compilation of international I-O tables.

Appendix A: Sector Changes in the 1995 I-O Table

I-O Sectors			
Unchanged	Coverage Changed	Combined	Separated/New
Livestock	Other crops	Dairy products***	Food chemicals & additives
Nursery pdts*	Quarrying & mining	Mill & starch pdts ⁺	Polymers & synthetic fibers
Aquarium fish	Fruit & veg preps	Other food preps ⁺⁺	Petrochemicals & pdts
Other fisheries**	Oils & fats	Yarn & fabrics ⁺⁺⁺	Metal precision components
Meat preparations	Coffee & tea	Garments [#]	Disk drives
Seafood preps	Tailoring & dressmkg	Wood & pdts ^{##}	Semiconductors
Biscuits	Textile articles	Paper & pdts ^{###}	Electron tubes
Bread & confectionery	Leather & fur pdts	Newspapers, books & magazines [']	Other electronic pdts
Noodles & related pdts	Wooden furniture & fixtures	Other printing ^{''}	Mattresses
Sugar & pdts	Paints	Industrial chemicals & gases ^{'''}	[Signs & displays distributed to 3 sectors]
Chocolate & pdts	Pharmaceutical pdts	Other chemical pdts [!]	Supporting services to water transport
Spices	Toiletries & cosmetics	Petroleum & pdts ^{!!}	Supporting services to air transport
Soft drinks	Cleaning & polishing preps	Processing of rubber & natural gums ^{!!!}	Airport operation services
Alcoholic drinks	Concrete pdts	Rubber pdts [^]	Other freight transport
Tobacco pdts	Nonmetallic mineral pdts	Other plastic products ^{^^}	Sightseeing & tourism
Millinery & other wearing apparel	Nonferrous basic metals	Basic iron & steel ^{^^^}	Information technology
Footwear	Noninsulated cable pdts	Other metal pdts ^{^^^^}	Σ = 15 sectors
Plastic precision pdts [@]	General hardware	Structural metal pdts ^{>}	

I-O Sectors			
Unchanged	Coverage Changed	Combined	Separated/New
Nonstructural ceramicware ^{@@}	Metal stampings	Metal containers ^{>>}	
Glass & glass pdts	General engineering works	Computers & peripheral equipment ^{>>>}	
Fiberglas & pdts	Other industrial machinery & equipment	Oil rigs & oilfield machinery ^{>>>>}	
Cement	Electric motors & generators	Land transport equipment ^{<}	
Bricks & earth-baked pdts	Switchgear & switchboard apparatus	Banks & finance companies ^{<<}	
Metal furniture	Other electrical industrial apparatus	$\Sigma = 23$ sectors	
Treatment & coating of metals ^{@@@}	Radio & sound recorders		
Lifting & hoisting machinery	Capacitors & resistors		
Refrigerators & air-conditioners	Printed circuit boards		
Microphones, loudspeakers & amplifiers	Recorded media [%]		
Televisions, video sets & disc players	Electrical wires & cables		
Communication equipment ^{\$}	Lamp & lighting fixtures		
Household appliances	Repairing of ships & boats		
Storage & primary batteries	Marine engines & ship parts		
Building of ships & boats	Scrap		
Watches & clocks	Aircraft		
Toys & recreational goods	Medical & scientific instruments		

I-O Sectors			
Unchanged	Coverage Changed	Combined	Separated/New
Jewelry	Photographic & optical goods		
Umbrellas	Other manufacturing		
Electricity	Gas		
Water	Other transport services		
Building construction	Accounting & secretarial services		
Other construction	Advertising & exhibitions		
Wholesale & retail trades	$\Sigma = 41$ sectors		
Food & beverage services ^{\$\$}			
Accommodation svc ^{\$\$\$}			
Passenger transport by land			
Freight transport by land			
Water transport			
Port services			
Air transport			
Warehousing services ^{%%}			
Crane & container svcs ^r			
Communications			
Life insurance			
General & other insurance			
Other financial services			
Real estate			
Legal services			

I-O Sectors			
Unchanged	Coverage Changed	Combined	Separated/New
Architectural & engineering services			
Petroleum & mining consultants			
Employment & labor contracting			
Leasing of machinery & equipment			
Management consultants			
Other business & technical services			
Producers of government services			
Security services			
Education			
Medical & health svcs			
Environment health svcs			
Cinema services			
Broadcasting & entertainment services			
Other recreational svcs			
Personal & household services			
Repairs of household goods			
Repairs of road transport equipment			
Domestic services & nonprofit bodies			
Ownership of dwellings			
$\Sigma = 76$ sectors			

*Renamed from Nursery & other flowers
 **Renamed from Other fishing
 ***Milk + Other dairy products
 +Wheat milling + Other milled products & animal feed
 ++Including soybean products
 +++Yarn + Woven fabrics + Knitted fabric
 #Shirts + Other Garments
 ##Sawmilling & preserving of wood + Plywood & veneer +Rattan processing + Other wood
 & cork pdts
 ###Paper, paperboard & paper articles + Paper containers
 'Newspapers + Books & magazines
 "Commercial & job printing + Other printing
 "'Industrial gases + basic industrial chemicals
 !Incense, joss sticks & matches + inks & carbon black + Other chemical products
 !!Petroleum refining + Bitumen & asphalt premix
 !!!Rubber processing + Processing of natural gums
 ^Tires & tubes + Other rubber products
 ^^Plastic sheets, bags & articles + Other plastic products
 ^^Iron & steel rolling mills + Iron foundries
 ^^^Cutlery & tools + Other metal pdts
 >Metal doors & windows + Metal pipes & tubes + Other structural metal pdts
 >>Tin cans + Other metal containers
 >>>Computers + Other office machinery & equipment
 >>>>Oilfield & gasfield machinery + Oil rigs
 <Motor vehicles + Motor vehicles bodies & parts + Motor cycles & nonmotorized vehicles
 <<Banking + Finance companies
 @Renamed from Plastic industrial supplies
 @@Renamed from Pottery & earthenware pdts
 @@@Renamed from Electroplating with a new commodity
 \$Renamed from Other communication equipment
 \$\$Renamed from Restaurants
 \$\$\$Renamed from Hotels
 %Renamed from Records & magnetic tapes
 %%Renamed from Forwarding & warehousing services
 ^Renamed from Crane & hoisting services

pdts = products

preps = preparations

svs = services

APPENDIX B

SINGAPORE TRADE STATISTICS

SIO: _____

SITC: _____

COUNTRY	(A) TOTAL IMPORTS	(B) TOTAL IMPORTS	(C) DOMESTIC EXPORTS	(D) RE- EXPORTS	(E) RETAINED IMPORTS
	Value in S\$ Thousand				
China (PRC)					
Hong Kong					
Japan					
Korea					
Malaysia					
Philippines					
Taiwan					
Thailand					
USA					
ROW					
Grand Total					
France					
Germany					
UK					
Rest of EC					
Belgium					
Denmark					
Greece					
Italy					
Luxembourg					
Netherlands					
Portugal					
Austria					
Finland					
Ireland					
Spain					
Sweden					
EU15					
Indonesia					
Adjusted Grand Total					

Sources: (a) International Enterprise Singapore
(b) Indonesia trade statistics

Note: Retained Imports = (A) – (D)
Re-exports = (B) – (C)

Appendix C: Imports by SIO Sector and Country of Origin (\$000)

Sector		Materials imported from									
SIC	Description	Malaysia	Indonesia	Other ASEAN countries	Japan	Middle East countries	Other Asian countries	USA	EU countries	Other countries	Total
15/16	FOOD PRODUCTS, BEVERAGES & TOBACCO	384,190	131,850	76,816	40,009	314	103,023	79,906	171,266	335,752	1,323,126
17	TEXTILES & TEXTILE MANUFACTURES	4,343	9,148	4,714	740	0	106,931	207	7,873	2,333	136,289
18	WEARING APPAREL EXCEPT FOOTWEAR	26,883	3,094	2,976	3,748	0	266,717	969	3,914	22	308,323
19	LEATHER, LEATHER PRODUCTS & FOOTWEAR	7,795	2,460	924	477	0	3,542	12,679	12,102	81,393	121,372
20	WOOD & WOOD PRODUCTS EXCEPT FURNITURE	35,913	48,126	7,188	411	7	9,418	4,605	8,900	1,463	116,031
21	PAPER & PAPER PRODUCTS	17,677	14,000	25,692	38,630	49	29,881	51,161	137,095	28,883	343,068
22	PRINTING & REPRODUCTION OF RECORDED MEDIA	17,302	96,869	74,695	79,025	435	98,821	42,419	158,098	34,634	602,298
23	REFINED PETROLEUM PRODUCTS	8,327	604	929,621	6,055	10,968,502	880	83,595	30,637	961,624	12,989,845
24	CHEMICALS & CHEMICAL PRODUCTS	305,136	100,346	89,189	381,028	126,905	321,533	703,072	885,308	133,795	3,046,312
25	RUBBER & PLASTIC PRODUCTS	102,636	17,094	17,866	159,958	6,055	109,616	123,267	47,097	2,245	585,834
26	NON-METALLIC MINERAL PRODUCTS	58,984	104,609	15,144	62,892	6,612	38,783	14,973	15,214	8,461	325,672
27	BASIC METALS	14,240	6,472	26,359	5,873	27,259	11,257	488	1,834	68,227	162,009
28	FABRICATED METAL PRODUCTS EXCEPT MACHINERY & EQUIPMENT	176,197	56,154	47,498	857,674	150,673	262,233	132,076	160,362	156,248	1,999,115
29	MACHINERY & EQUIPMENT	103,668	9,405	77,194	437,681	1,138	143,970	566,896	333,865	46,984	1,720,801
30	ELECTRICAL MACHINERY & APPARATUS	152,923	9,697	11,489	156,434	9,600	116,842	79,189	119,222	32,387	687,783
31	ELECTRONIC PRODUCTS & COMPONENTS	1,775,123	598,024	3,268,860	4,408,771	6,971	4,205,412	4,607,417	2,425,210	2,723,771	24,019,559
32	MEDICAL, PRECISION & OPTICAL INSTRUMENTS, WATCHES & CLOCKS	57,828	62,858	39,494	110,699	344	83,908	299,452	208,487	47,930	911,000
33	TRANSPORT EQUIPMENT	23,586	33,373	1,722	156,044	2,477	54,065	1,100,336	284,818	88,083	1,744,504
34	OTHER MANUFACTURING INDUSTRIES	53,629	21,883	5,796	25,414	581	41,221	25,380	28,500	2,797	205,201
35	RECYCLING OF METAL/NON-METAL WASTE & SCRAP	4,057	4,156	6,827	3,068	7,129	4,292	1,876	3,956	2,162	37,523

Survey on Freight and Insurance

We are conducting a study on inter-industrial linkages among ten countries in the Asia-Pacific region. The study requires freight and insurance rates for estimating imports at fob prices. We would appreciate it very much if you could provide us with some information from your recent purchase records.

Q1 What are the 5 major items imported by your company?	Q2 What are the 3 top countries from which your company imported these items?	Q3 Are these items imported by sea or air ?	Q4 What is the freight cost * for importing each of these items from their respective country of import?	Q5 What is the insurance cost for importing each of these items from their respective country of import?	Q6 What is the fob value of the imported item ?
Commodity	Country of import	Type of Freight	Freight charges S\$	Insurance charge S\$	S\$
1.	1.				
	2.				
	3.				
2.	1.				
	2.				
	3.				
3.	1.				
	2.				
	3.				

Q1 What are the 5 major items imported by your company?	Q2 What are the 3 top countries from which your company imported these items?	Q3 Are these items imported by sea or air ?	Q4 What is the freight cost *for importing each of these items from their respective country of import?	Q5 What is the insurance cost for importing each of these items from their respective country of import?	Q6 What is the fob value of the imported item ?
Commodity	Country of import	Type of Freight	Freight charges S\$	Insurance charge S\$	S\$
4.	1.				
	2.				
	3.				
5.	1.				
	2.				
	3.				

Q7

*If the freight charges quoted above **contain some other types of services**, on top of the basic port to port transportation, e.g. transport from port to company, please indicate the **types of services included** in that freight charge and the **costs** of each type of service, if available.

Type of service	Cost of service

Type of service	Cost of service

Q8

Would you like us to forward you a set of the estimates on freight and insurance?

☐

Yes

☐

No

Thank you for your valuable time and contribution to the study.

TAIWAN

Tsai-Yi Wu, Hung-Chyn Chen and Yu-Min Yen
Taiwan Research Institute

1. INTRODUCTION

1.1 Brief history of the national I-O table

The framework for input-output (IO) analysis was established in the 1930s. Professor Wassily Leontief first published “Quantitative Input and Output Relations in the Economic System of the United States” in the *Review of Economic Statistics* in 1936. In this paper he applied Walras’ general equilibrium theory to empirical analysis of a national economy and presented U.S. I-O tables for 1919, 1929, and 1936. After that, he published “Structure of the American Economy, 1919–1929—an Empirical Application of Equilibrium Analysis” to set up the theory and structure of I-O analysis in 1941. From the 1950s to 1970s, Professor Leontief published many related books and papers discussing additional development of techniques for how to estimate and analyze I-O models. Since the national I-O (NIO) tables played an important role for economic planning and prediction, many other countries began to construct their own NIO tables.

The first NIO table of Taiwan (TIO) was established in 1960. There were 23 sectors included in the 1954 TIO table. Later on, in 1961, the Council of Agriculture constructed the second TIO table (of 1955), with 9 sectors in order to analyze agricultural technology. After 1961, coordinating with the publication of the census of industry, commerce, and service, a more detailed TIO table started to be published every five years.

Meanwhile, because of economic development and dramatic change in economic structure, the number of sectors in the TIO table has largely increased. In the TIO table of 1961, there were 37 sectors, including 6 agricultural sectors, 3 mineral sectors, 23 manufacturing sectors, the electricity, gas, and water supply sector, the construction sector, the transport and storage sector, the communication sector, and other services sector. In the version for the year 1996, the Directorate General of Budget Accounting and Statistics (DGBAS) included 596 sectors in constructing the TIO table. The latest TIO table was for the year 2001, which

included 610 sectors. In addition, there was one extension table between the two census years. For example, the 1999 TIO table, including 160 sectors, was indirectly estimated from the data without a census.

1.2 Features of the national I-O table

The NIO table shows the flow of supply and demand of goods and services in an economic system. In the process of a transaction, the prices of goods has the relation as follows:

$$\text{Purchasers' Prices} = \text{Producers' Prices} + \text{Transportation Margins} + \text{Trade Margins}$$

Since the transportation and trade margins (TTM) are counted into the transportation sector and the trade sector, respectively, we only consider the producers' prices in the TIO table. Excluding the effects of TTM, the coefficients between each input should be stable and easy to apply when discussing the economic structure.

In the TIO table of 1999, there contains the following five tables: Transaction Table at Producers' Price, Input Coefficients Table, Impact Coefficients Table, Transactions Table of Domestic Goods and Services, and Transactions Table of Import Goods and Services. Besides, a TIO table offers the information of transactions at purchasers' price in every census year, for example, in 1996 and 2001.

It is clear that the number of sectors can vary from only a few to hundreds and even thousands for different purposes. For instance, in the TIO table with 596 sectors, "Paddy Rice" and "Straw & Other By-Products" are different sectors, but in the TIO table with 160 sectors, they are both included in "Paddy Rice." In general, how to divide one industry sector into various subsectors depends on the following:

- In order to implement economic planning, the government would like to obtain information about some important industries. Hence, these industry sectors would be uniquely determined.
- The more value industrial sectors produce, the more important they are for the economy. Industrial sectors that generate a lot of value should usually be distinguished from others.
- Some industrial sectors have strong growth potential. If such a sector has gradually developed and may become an important sector in the future, it may be helpful for further analysis if the industry can be distinguished from others.
- The economy of a country may largely depend on international trade or on domestic

consumption. Therefore, it is useful to divide industrial sectors according to how they are related to these activities.

- For the sake of comparison, different countries may divide industrial sectors by following the same rules of classification.

Table 1 shows the basic structure of an NIO table. In the next sections, we shall discuss each element of this table separately. The goal for the Asian International Input-Output Project is to construct the 2000 multilateral input-output table for Asian countries. Therefore, we shall report an extended NIO table (Table 2) for Taiwan to match the unified format requested by the project.

Table 1: Input-Output Transaction Table

Unit: NT\$10,000

		Domestic Transaction					Final Demand					Control Total
		Sec. 1	Sec. 2	...	...	Sec.76	Household Consumption	Government Consumption	Fixed Capital Formation	Inventory Change	Exports	
Domestic Transaction	Sec. 1											
	Sec. 2											
	⋮			A							C	
	⋮											
	Sec. 76											
Import Sections	Sec. 1											
	Sec. 2											
	⋮						B				D	
	⋮											
	Sec. 76											
Value Added	Compensation of Employees											
	Operating Surplus											
	Consumption of Capital											
	Indirect Taxes											
Control Total												

Source: Industrial Structure of the Asia-Pacific Region Project, 2000.

Table 2: Extended Taiwan Input-Output Table

Unit: NT\$10,000

		Domestic Transaction					Final Demand							Control Total	
		Sec. 1	Sec. 2	...	...	Sec.76	Household Consumption	Government Consumption	Fixed Capital Formation	Inventory Change	Exports			
											Indonesia	.....	R.O.W.	
Domestic Transaction	Sec. 1														
	Sec. 2														
	⋮														
	⋮														
	Sec. 76														
Import Sections	Indonesia	Sec. 1													
		Sec. 2													
		⋮													
		⋮													
		Sec. 76													
	⋮	⋮													
	R.O.W.	Sec. 1													
		Sec. 2													
		⋮													
		⋮													
		Sec. 76													
Value Added	Compensation of Employees														
	Operating Surplus														
	Consumption of Capital														
	Indirect Taxes														
Control Total															

Source: Industrial Structure of the Asia-Pacific Region Project, 2000.

2. ESTIMATION WORK

As mentioned above, since the 1996 TIO table has been constructed by coordinating with the census of industry, commerce, and service, it is a more accurate and detailed table. From this table, which contains 596 sectors, we can obtain a transaction table of domestic goods and services. The 1996 TIO table refers to about two hundred kinds of government statistical data and survey statistics. For instance, *the Report on Agricultural, Forestry, Fishery and Husbandry Census, the Report on Industry, Commerce and Service Census, Report on the Survey of Family Income and Expenditure Survey, Taipei City, Report on the Survey of Family Income and Expenditure Survey, Kao-Hsiung City, Survey Report on Motor Vehicle Freight Traffic, and Balance of Payments* are included.

However, the 1999 TIO table offers only a transaction table with 160 sectors. The main references for this table include *Survey Report on Industrial Production Cost, Survey Report on Taiwan's Agricultural Production Cost, Survey Report on Forestry Production Cost, Import and Export Statistics from Customs*, etc.

In the following subsections, we shall use the 1999 TIO table and the 1996 TIO table to construct the 2000 TIO table.

2.1 Control Totals (CT)

In order to construct the 2000 TIO table, we need to construct a 76-sector table from different data sources. First, we apply the code concordance to extend the 1999 TIO table from 160 sectors to 596 sectors. We then merge the 1999 TIO table into 76 sectors. Second, we merge the 1996 TIO table from 596 sectors into 76 sectors. We further calculate each sector's growth rate of the control total from 1996 to 1999 and compute the average annual growth rate of the control total. Using the average annual growth rate, we finally estimate each sector's value for the control totals for year 2000.

2.2 Final Demand

2.2.1 Final Demand items

In general, we use data from the national income statistics and the 1999 TIO tables to estimate final demand items. We first estimate each final demand item from 596 sectors in

1999 (they are extended from 160 sectors, as mentioned above), and calculate the component ratio of every final demand value (household consumption, government consumption, fixed capital formation, inventory change and export) to its total value in each sector. We then use the ratio to obtain figures for 596 sectors for the year 2000. Finally, we use the code concordance to merge these 596 sectors and obtain final demand for 76 sectors.

2.2.2 Export of goods and services

For the export of goods and services, we now have a 76 by 1 export matrix (see Part C in Table 1) in the 2000 TIO table. We shall extend it to a 76 by 12 matrix (see Part C' in Table 2). In general, the export table should be constructed by using national account data. A problem we encounter is that the national account does not provide the information regarding export destinations. *Territorial Export from Foreign Trade Statistics*¹ can provide details about export destinations; however, its data do not include services. We thus have two alternative approaches for adjusting the export data.

- (1) We can use the *Territorial Export from Foreign Trade Statistics* only to adjust the export data. The difference between *Export from TIO table* and *Territorial Export from Foreign Trade Statistics* is called invisible export. Each country's share in such invisible export is difficult to identify and hard to define; therefore, we add the invisible export in the R.O.W. column. Additionally, the nonterritorial export will also be considered part of export to the R.O.W. With the revised R.O.W. column, the adjusted 76 by 12 export matrix is then produced.
- (2) We can add the nonterritorial export and territorial export from Foreign Trade Statistics together. We then calculate the invisible export, which is the difference between *Export from TIO table* and *Export from Foreign Trade Statistics*. Finally, we add the invisible export into the R.O.W. column.

In fact, we should get the same result with these two methods. For instance, the export of sector 1 goods to Indonesia is 44 (in NT\$10,000), and the total export of sector 1 goods is 43,770 (in NT\$10,000). (See Table 3.)

The tourists' direct purchases are included in nonterritorial export. The data mainly rely on *Survey Report on Foreign Tourists Consumption and Trend* reported by the Tourism Bureau

¹Since the unit of the import and export data from *Foreign Trade Statistics* (two 76×12 matrices) is US\$1,000, each cell was multiplied by the exchange rate (NT\$31.2252/US\$1) and divided by 10 in order to match the unit of the original TIO table: NT\$10,000. The exchange rate is the average interbank spot market closing rate for 2000. (<http://www.cbc.gov.tw/EngHome/Eforeign/Statistics/Eyearly.asp>)

of the Ministry of Transportation and Communications. Besides, nonterritorial export also contains the consumption of foreign students, ambassadors and their staff, and foreign residents in Taiwan.

Table 3: Division of the Export Sector by Destination Country

Unit: NT\$10,000

	Indonesia	Malaysia	.....	EU 15	R.O.W.	Total
Sec. 1	44	0	.....	0	33,612	43,770
Sec. 2	0	0	.....	3	2,691	3,656
⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮
Sec. 76	0	0	.....	0	3,107,647	3,107,647

Source: 1. Directorate General of Customs, Ministry of Finance, 2001.

2. 2000 TIO table.

Note: 1. The total export column is from the TIO table. The export data by destination except R.O.W. are from Foreign Trade Statistics.

2. See Table A-1 for detailed figures.

2.2.3 Import of goods and services

When we construct the import table, we mainly adapt the *Transactions Table of Import Goods and Services* in the 1999 TIO table. As mentioned before, we have to extend the import matrix from 160 sectors to 596 sectors then merge them into 76 sectors. We now obtain a 76 by 76 import matrix. Applying the RAS method to the domestic transaction matrix and the import matrix, we get the 2000 TIO table. (See Section 2.4 for details on the RAS method.)

2.3 Value Added

For estimation of valued added, we apply a similar procedure to obtain this component ratio of 596 sectors in 1999. First, extend the 1999 TIO table from 160 sectors to 596 sectors. Second, calculate the component ratio of each value-added item. Third, multiply each ratio by the GDP for the year 2000 (NT\$ 9,663,388 million). Table 4 shows each item of value added for 1999 and 2000.

Table 4: Value added in 1999 and 2000

Unit: NT\$10,000

Year	Compensation of Employees	Operating Surplus	Consumption of Capital	Indirect Taxes	Adjust Terms (Subsidies)	Aggregate (GDP)
1999	468,723,500	310,600,400	80,414,400	72,681,000	-3,426,400	928,992,900
2000	493,105,892	315,823,818	87,694,792	68,026,798	1,687,500	966,338,800

Source: Each component of value added in 1999 and GDP of 2000 come from DGBAS, 2001.

Note: Each component of value added in 2000 is from an estimate.

2.4 Intermediate Transactions

Intermediate transaction estimation is the most difficult part in making the 76 by 76 TIO table. The reasons are as follows: first, since DGBAS only provides the 596×160 and 160×160 TIO tables, and we need to match the common classification with other Asian countries, we have to reallocate the TIO table from 160 sectors to 76 sectors. With the code concordance constructed by this project, we can convert a 596×596 matrix to a 76×76 matrix. Hence, how to convert the table from a 596×160 matrix to a 596×596 matrix is the first question to tackle. Next, the 596×160 and 160×160 tables provided by DGBAS are for 1996 and 1999, respectively. How to estimate and update the data for the year 2000 would be the second problem.

We first use the concordance to calculate the product coefficient. For example, the component ratio of “Paddy Rice” in the 596×596 table of domestic transaction of goods and services is shown in Table 5. In the original 596×160 table, we can only obtain data in the third column. Figures in the second row are from the concordance, which shows ratios of domestic product value in subsectors to sectors. Other figures in Table 5 are obtained by multiplying the numbers in the corresponding column and row (for instance, 0.9071 is equal to 0.9187×0.9874). Thus we can follow this procedure to expand a 596×160 table to a 596×596 table. By the RAS method, we can further obtain the matrix of domestic transactions of goods and services for the year 2000. Finally, after multiplying the ratio by the estimated product value of each sector, we can get a 596×596 matrix for 2000. Again, using the code concordance, we can produce a 76×76 domestic transaction matrix for 2000. Accordingly, we have finished Part A' of Table 2.

Table 5: Composition Ratio of Paddy Rice in the 596×596 Table of Domestic Transaction of Goods and Services

Code	Sector	Paddy Rice	Paddy Rice	Straw & Other By-Products
001	Paddy Rice	1.0000	0.9874	0.0126
00110	Paddy Rice	0.9187	0.9071	0.0116
00195	Straw and Other By-Products	0.0813	0.0803	0.0010

Source: 1. DGBAS, 2000a.

2. DGBAS, 2002b.

2.5 Import Matrix

When referring to the import matrix, we face the same problem as with the export table. *Foreign Trade Statistics* offers data for the first 60 sectors but not the data from sector 61 to sector 76. Following the same procedure, we use the data in *Import from TIO table* to estimate the data for the last 16 sectors.

The proportional import table is created from the nominal import table, which is obtained from *Foreign Trade Statistics*. Table 6 shows the proportion of sector i ($i = 1, \dots, 60$) imported from each country. For instance, the percentage of sector 1 goods (Paddy Rice) imported from Thailand is 47.73%, the percentage of sector 1 goods imported from the U.S. is 30.68%, and the percentage of sector 1 goods imported from R.O.W. is 21.59%. Obviously, the percentage of sector 1 goods from 12 regions (countries) is summed to 100%.

Table 6: Proportion of the Import Matrix by Country of Origin

Unit: %

	Indonesia	Malaysia	.....	EU 15	R.O.W.	Total
Sec. 1	0.00	0.00	.....	0.00	21.59	100.00
Sec. 2	0.00	0.00	.....	0.01	3.89	100.00
⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮
Sec. 60	0.54	0.92	.....	24.49	9.41	100.00

Source: Directorate General of Customs, Ministry of Finance, 2001.

Note: See Table A-2 for detailed figures.

Using the proportional import table, we can extend the import matrix from 76 by 80 (Part B in Table 1) into 736 by 80 (Part B' in Table 2).

Since Foreign Trade Statistics does not include the services imported, sectors 61 to 76 (the service sectors) cannot be divided into 12 regions (countries) in the extended import table. Hence, we shall attribute the services goods as imported from R.O.W. With the first 60 sectors divided to 12 regions (countries) by using the proportional table (Table 6), we obtain 720 (=60×12) rows. For instance, the value of the sector 4 goods imported from Indonesia (which is used for producing sector 1 goods) is 510 (in NT\$10,000). This value 510 is 3.33% of 15,303, where 3.33% is the percentage of sector 4 goods imported from Indonesia (Table 6), and 15,303 (in NT\$10,000) is the total import value of sector 4, which is used for producing sector 1 goods, in the original TIO table.

By adding to the last 16 rows (sectors 61 to 76), the extended import matrix is then constructed. To sum up, the demand side of the extended TIO table (816 rows) includes 76 sectors of domestic transactions, 736 sectors of import sectors, and 4 sectors of value added (see Table 2).

After constructing the extended TIO table, we need to check whether the numbers in Table 2 are consistent with economic theory. For instance, GDP should equal total value added. In Table 2, the total value added was 966,338,800 (in NT\$10,000), which equals GDP for the year 2000. Moreover, Total Final Demand (1,470,160,100 in NT\$10,000) equals the sum of total value added (966,338,800 in NT\$10,000) and total import (503,821,300 in NT\$10,000).

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

The trade margin is the difference between the sales price and the buying price of goods and services after deducting transportation costs. It is also called “the value generated by salesmen.” Theoretically, trade margins are calculated as of time sales procedure when traders, wholesalers, or retailers make transactions.

Data on domestic trade and transportation come from 'Transactions Table at Purchasers' Prices in the 1996 TIO table. We use the categories classified by the concordance and then merge data of 596 sectors into 76 sectors. Dividing both the domestic trade margins and transportation margins by total demand, we obtain the ratios of trade margins and transportation margins. With these ratios, we can estimate the trade margins and domestic transportation costs for the year 2000 by multiplying these ratios by total demand for the year 2000.

Table 7: Domestic Trade and Transportation Margins for 76 sectors

Code	Sector	Trade Margins	Transport Margins	Total Demand	Trade Margins Ratio	Transport Margins Ratio
1	Paddy Rice	2,180	222	41,757	0.0522	0.0053
2	Other grain	4,517	1,041	54,719	0.0825	0.0190
3	Food crops	90,940	6,151	246,584	0.3688	0.0249
4	Nonfood crops	10,114	1,925	59,400	0.1703	0.0324
5	Livestock and poultry	27,153	2,088	219,278	0.1238	0.0095
6	Forestry	3,384	595	17,178	0.1970	0.0346
7	Fishery	59,940	1,417	171,692	0.3491	0.0083
8	Crude petroleum and natural gas	0	809	166,681	0.0000	0.0049
9	Iron ore	0	263	16,979	0.0000	0.0155
10	Other metallic ore	0	102	2,006	0.0000	0.0508
11	Nonmetallic ore and quarrying	6,564	14,418	118,938	0.0552	0.1212
12	Milled grain and flour	10,640	1,269	75,771	0.1404	0.0167
13	Fish products	23,363	1,456	142,883	0.1635	0.0102
14	Slaughtering and meat products	64,031	1,091	244,879	0.2615	0.0045
15	Other food products	60,575	6,770	347,160	0.1745	0.0195
16	Beverage	37,808	2,607	156,938	0.2409	0.0166
17	Tobacco	12,979	198	54,356	0.2388	0.0036
18	Spinning	4,950	1,123	67,122	0.0737	0.0167

Code	Sector	Trade Margins	Transport Margins	Total Demand	Trade Margins Ratio	Transport Margins Ratio
19	Weaving and dyeing	28,636	4,340	364,424	0.0786	0.0119
20	Knitting	32,775	1,668	168,887	0.1941	0.0099
21	Wearing apparel	32,286	1,409	129,938	0.2485	0.0108
22	Other made-up textile products	18,563	1,012	114,899	0.1616	0.0088
23	Leather and leather products	14,384	1,499	84,910	0.1694	0.0177
24	Timber	8,891	2,207	49,076	0.1812	0.0450
25	Furniture	7,739	1,454	55,913	0.1384	0.0260
26	Other wooden products	7,168	2,276	53,853	0.1331	0.0423
27	Pulp and paper	39,941	4,876	265,711	0.1503	0.0184
28	Printing and publishing	50,652	1,330	205,720	0.2462	0.0065
29	Synthetic resins and fiber	23,646	3,029	429,931	0.0550	0.0070
30	Basic industrial chemicals	14,717	3,354	346,526	0.0425	0.0097
31	Chemical fertilizers and pesticides	3,469	1,281	32,413	0.1070	0.0395
32	Drugs and medicine	32,561	992	116,645	0.2791	0.0085
33	Chemical final products	54,403	4,967	357,136	0.1523	0.0139
34	Refined petroleum and its products	42,258	5,913	398,414	0.1061	0.0148
35	Plastic products	38,173	5,573	417,093	0.0915	0.0134
36	Tires and tubes	6,622	916	42,458	0.1560	0.0216
37	Other rubber products	5,814	965	58,553	0.0993	0.0165
38	Cement and cement products	8,790	9,243	140,951	0.0624	0.0656
39	Glass and glass products	5,543	1,264	70,594	0.0785	0.0179
40	Other nonmetallic mineral products	13,592	2,713	106,686	0.1274	0.0254
41	Iron and steel	103,730	18,265	1,041,438	0.0996	0.0175
42	Nonferrous metal	44,369	6,268	436,678	0.1016	0.0144
43	Metal products	16,860	778	134,318	0.1255	0.0058
44	Boilers, Engines, and turbines	3,727	330	20,774	0.1794	0.0159
45	General machinery	61,524	5,346	462,529	0.1330	0.0116
46	Metal working machinery	8,684	901	119,389	0.0727	0.0075
47	Specialized machinery	49,932	4,193	426,413	0.1171	0.0098
48	Heavy Electrical equipment	8,246	1,564	139,346	0.0592	0.0112
49	Television sets, radios, audio, and communication equipment	41,090	2,654	403,152	0.1019	0.0066
50	Electronic computing equipment	40,888	3,457	713,487	0.0573	0.0048
51	Semiconductors and integrated circuits	17,886	4,343	562,630	0.0318	0.0077
52	Other electronics and electronic products	22,629	4,202	486,134	0.0465	0.0086
53	Household electrical equipment	8,342	619	58,173	0.1434	0.0106
54	Lighting fixtures, batteries, wiring, and others	28,993	1,607	271,881	0.1066	0.0059
55	Motor vehicles	84,143	3,167	570,771	0.1474	0.0055

Code	Sector	Trade Margins	Transport Margins	Total Demand	Trade Margins Ratio	Transport Margins Ratio
56	Motor cycles	20,022	637	127,069	0.1576	0.0050
57	Shipbuilding	142	90	44,701	0.0032	0.0020
58	Other transport equipment	3,690	1,257	137,948	0.0267	0.0091
59	Precision machines	39,388	1,479	211,485	0.1862	0.0070
60	Other manufacturing products	27,984	3,944	238,080	0.1175	0.0166
61	Electricity and gas	12,484	392	351,841	0.0355	0.0011
62	Water supply	0	82	33,599	0.0000	0.0024
63	Building construction	0	0	512,359	0.0000	0.0000
64	Other construction	0	0	531,076	0.0000	0.0000
65	Wholesale and retail trade	-1,561,018	0	0	0.0000	0.0000
66	Transportation	0	-171,517	601,592	0.0000	-0.2851
67	Telephone and telecommunication	0	0	200,402	0.0000	0.0000
68	Finance and insurance	0	0	783,350	0.0000	0.0000
69	Real estate	0	0	222,867	0.0000	0.0000
70	Education and research	0	0	381,803	0.0000	0.0000
71	Medical and health service	0	0	247,037	0.0000	0.0000
72	Restaurants	0	0	211,367	0.0000	0.0000
73	Hotels	0	0	111,919	0.0000	0.0000
74	Other services	0	0	1,911,563	0.0000	0.0000
75	Public administration	0	0	852,936	0.0000	0.0000
76	Unclassified	6,504	116	180,511	0.0360	0.0006
Total		0	0	19,955,670		

Source: DGBAS, 2000a.

3.2 Import duties and import commodity taxes

Import taxes and import commodity taxes, which include import duties, port construction fees, and commodity taxes, are parts of indirect taxes. In order to stimulate economic development and protect domestic industries, a government may levy taxes on imported commodities or input materials. Furthermore, in order to encourage investment and export, input materials for export goods are usually exempted from duties. We thus calculate the *net import duties* as gross import tax, deducting the exemptions.

In the 1996 TIO tables and 1999 TIO tables, the net import duties are included in the indirect taxes. As a result, we only need to follow the same rule as we treat value-added items in Section 2.3.

3.3 International freight and insurance

In this project, which we compile the AIO table at producer's price, each cell of the import table should be valued at producer's price, as should the domestic transaction table. We valued the import table for each country of origin at CIF value in the process of division of the original import table, which included customs, insurance, and freight. Thus, it is needed to exclude these value in order to compile the AIO table at producer's price. Customs data is supplied from customs statistics. Then international freight and insurance rates are obtained from Foreign Trade Statistics (FTS) data in Taiwan.

Referring to FTS in Taiwan, international insurance and freight are supplied for each commodity code (HS) of import, by country of origin. Each commodity code is converted to AIO code, referencing the HS-AIO concordance table. Then import value, insurance, and freight are aggregated by AIO code and by country of origin, respectively. After all, those aggregated insurance and freight are divided by the aggregated value of import commodity and by country of origin for ratio of international insurance and freight.

3.4 Employment matrix

To construct employment matrix, we use the following two data sources: *Yearbook of Manpower Survey Statistics, Taiwan Area, ROC, 2000 (YMSS)* and *Report on Manpower Utilization Survey, Taiwan Area, ROC, 2000 (RMUS)*. The first data source *YMSS* contains 11 sectors (and 70 subsectors) and four categories of employment status, while the second data source *RMUS* includes the figures for sideline employment.

In this project, the final employment matrix should contain 76 AIO sectors and three categories of employment status: "Employee," "Own-account Worker," and "Unpaid Family Worker." First, we define the figure for "Own-account Workers" in the AIO table as the sum of the number of employers and the number of own-account workers in *YMSS*. Second, we assume sideline employment as included in "Employees." Third, using the employment proportion from the first data source, we divide the sideline employment data from 11 sectors into 70 subsectors. Therefore, we can obtain an employment matrix with 70 sectors and 3 categories for employment status.

Finally, with the concordance (see Table 8), we use the "Compensation of Employees" from

the TIO table to be the weight when we need to divide the employment of one sector from *YMSS* into more than one sector for the Taiwan employment matrix (76 sectors). For example, we need to distribute the number for Sector 1.1 (Agriculture, animal husbandry) in *YMSS* (70 sectors) into Sector 1 to Sector 5 in the Taiwan's employment matrix (76 sectors). In Sector 1 of the Taiwan's employment table, the number of employees is 54.474 (in thousands of persons), which is $430 \times [1,191,420 / (1,191,420 + 118,350 + 4,675,379 + 2,034,850 + 1,384,618)]$. Table 8 shows the final result for the employment matrix.

Table 8: The Employment Matrix for Taiwan, 2000

Unit: 1,000 persons

2000 Asian I-O		Yearbook of Manpower Survey Statistics	Employee	Own-Account Worker	Unpaid Family Worker
No.	Sector	Code			
1	Paddy Rice	1.1	54.474	23.310	10.501
2	Other grain	1.1	5.411	2.315	1.043
3	Food crops	1.1	213.769	91.473	41.209
4	Nonfood crops	1.1	93.038	39.812	17.935
5	Livestock and poultry	1.1	63.308	27.090	12.204
6	Forestry	1.2	1.000	0.000	7.536
7	Fishery	1.3	31.000	10.000	34.664
8	Crude petroleum and natural gas	2.2	0.000	0.000	2.000
9	Iron ore	2.3	0.000	0.000	0.000
10	Other metallic ore	2.3	0.000	0.000	0.000
11	Nonmetallic ore and quarrying	2.1 2.4 2.5	0.000	0.000	7.000
12	Milled grain and flour	3.1	0.751	0.501	7.729
13	Fish products	3.1	0.951	0.634	9.787
14	Slaughtering and meat products	3.1	1.780	1.187	18.316
15	Other food products	3.1	6.307	4.205	64.900
16	Beverage	3.1	2.210	1.474	22.745
17	Tobacco	3.2	0.000	0.000	1.004
18	Spinning	3.3	1.255	0.558	16.241
19	Weaving and Dyeing	3.3	4.876	2.167	63.091
20	Knitting	3.3	2.869	1.275	37.118
21	Wearing apparel	3.4	5.816	2.237	58.839
22	Other made-up textile products	3.4	7.184	2.763	72.668
23	Leather and leather products	3.5	2.000	1.000	25.097
24	Timber	3.6	1.456	0.624	5.847

2000 Asian I-O		Yearbook of Manpower Survey Statistics	Employee	Own-Account Worker	Unpaid Family Worker
No.	Sector	Code			
25	Furniture	3.7	5.000	2.000	47.182
26	Other wooden products	3.6	5.544	2.376	22.262
27	Pulp and paper	3.8	5.000	3.000	48.186
28	Printing and publishing	3.9	17.000	8.000	49.190
29	Synthetic resins and fiber	3.10	0.558	0.000	32.492
30	Basic industrial chemicals	3.10	0.442	0.000	25.733
31	Chemical fertilizers and pesticides	3.11	0.174	0.087	4.713
32	Drugs and medicine	3.11	0.510	0.255	13.817
33	Chemical final products	3.11	1.316	0.658	35.679
34	Refined petroleum and its products	3.12	0.000	0.000	15.058
35	Plastic products	3.14	15.000	8.000	127.492
36	Tires and tubes	3.13	0.994	0.331	13.974
37	Other rubber products	3.13	2.006	0.669	28.189
38	Cement and cement products	3.15	1.724	0.345	22.499
39	Glass and glass products	3.15	1.441	0.288	18.812
40	Other nonmetallic mineral products	3.15	1.835	0.367	23.942
41	Iron and steel	3.16	2.188	0.729	48.321
42	Nonferrous metal	3.16	0.812	0.271	17.935
43	Metal products	3.17	69.000	25.000	298.151
44	Boilers, Engines, and turbines	3.18	0.315	0.114	1.925
45	General machinery	3.18	12.550	4.518	76.602
46	Metal working machinery	3.18	2.619	0.943	15.984
47	Specialized machinery	3.18	9.515	3.426	58.077
48	Heavy electrical equipment	3.19	1.041	0.248	33.629
49	Television sets, radios, audio, and communication	3.19	2.670	0.636	86.296
50	Electronic computing equipment	3.19	5.991	1.426	193.604
51	Semiconductors and integrated circuits	3.19	3.667	0.873	118.515
52	Other electronics and electronic products	3.19	5.111	1.217	165.156
53	Household electrical equipment	3.19	0.329	0.078	10.626
54	Lighting fixtures, batteries, wiring, and others	3.19	2.191	0.522	70.795
55	Motor vehicles	3.20	3.388	0.565	65.749
56	Motor cycles	3.20	0.722	0.120	14.021
57	Shipbuilding	3.20	0.550	0.092	10.665
58	Other transport equipment	3.20	1.340	0.223	26.015

2000 Asian I-O		Yearbook of Manpower Survey Statistics	Employee	Own-Account Worker	Unpaid Family Worker
No.	Sector	Code			
59	Precision machines	3.21	3.000	1.000	27.105
60	Other manufacturing products	3.22	11.000	4.000	64.248
61	Electricity and gas	4.1 4.2	0.000	0.000	28.000
62	Water supply	4.3 4.4	0.000	0.000	8.000
63	Building construction	5.2	24.000	4.000	367.648
64	Other construction	5.1 5.3 5.4 5.5	90.000	14.000	339.367
65	Wholesale and retail trade	6.1 6.2	589.000	246.000	690.061
66	Transportation	7.1	121.000	7.000	278.357
67	Telephone and telecommunication	7.3	0.000	0.000	70.598
68	Finance and insurance	8.1 8.2 8.3	2.000	0.000	365.915
69	Real estate	8.4	8.000	1.000	35.088
70	Education and research	10.9	123.449	25.517	162.918
71	Medical and health service	10.9	55.551	11.483	73.312
72	Restaurants	6.4	144.000	85.000	214.368
73	Hotels	10.8	2.000	1.000	30.416
74	Other services	6.3 7.2 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 10.1 10.2 10.3 10.4 10.5 10.6 10.7	174.000	29.000	1398.069
75	Public administration	11.1 11.2	0.000	0.000	316.000
76	Unclassified		7.000	1.000	3.002
Total			2036.000	710.000	6851.233

Source: 1. DGBAS, 2000b.

2. DGBAS, 2002a.

3.5 Others

3.5.1 Domestic commodity tax

In the 1996 TIO table and the 1999 TIO table, net domestic commodity taxes, net import duties, value-added taxes, and other taxes are included in indirect taxes. As a result, we only need to follow the same rule as when treating value-added items in Section 2.3.

3.5.2 Scrap and by-products

Most scrap, like old newspapers, is treated by the gross-counting method. In the 1999 TIO table, for those sectors using scrap as input, the input value should be counted into the unclassified sector. Only some valuable scrap, like wine bottles and soda bottles, are treated by the transfer method.

Most by-products and main-products are counted into the same sectors. For example, rice and straw both belong to sector 1 (Paddy Rice). In some special situations, we can first put the by-products and main-products together in the same sector, and then the by-products are treated as the input of the by-products sector. For example, this method is applied to Liquefied Petroleum Gas (LPG), and nonprofessional advertising.

4. CODE CONCORDANCE

It is clear that the code concordance is crucial for constructing the AIO table when the AIO table and the NIO table have different structures of industrial sectors. Table 9 shows the basic framework of the code concordance for the TIO table and the AIO table for domestic goods and services. In this table, we use the data from the 1996 TIO table and the 1999 TIO table. We also refer to the classifications of the 1995 AIO table and the 2000 AIO table.

The first two columns contain codes and descriptions of industrial sectors in the 2000 and 1995 AIO tables. In the 2000 and 1995 AIO tables, they have 76 and 56 sectors, respectively. The next two columns show information from the 1996 TIO table and the 1999 TIO table. Again, there are 596 and 160 industrial sectors in the 1996 and 1999 TIO tables, respectively. As mentioned above, 596 sectors can be treated as divisions of 160 sectors. In the columns of the 1996 TIO (596 sectors), ‘Code’ means code of industrial sectors in the table, ‘Value’ is the

product value of domestic goods and services in each subsector, 'Value (total)' is the product value of each sector (sum of product value in each subsector), and 'Ratio' is calculated by dividing value by value (total), which shows the proportion of each subsector's product value to the sector's value. Since we do not have detailed data for 596 sectors of 1999, we use the ratio to calculate approximate values by multiplying Value (total) in the 1999 TIO by the ratio, which are shown in the last column of Table 9.

Table 9: Concordance for AIO and TIO for Domestic Goods and Services (Illustrated)

2000 Asian I-O		1995 Asian I-O		1996 TIO (596 sectors)				1999 TIO (160 sectors)		
Code	Description	Code	Description	Code	Value	Value (total)*	Ratio	Code	Value (total)*	Value*
001	Paddy Rice	001	Paddy Rice	00110	41,750	42,281	0.9874	001	40,016	39,513
				00195	531	42,281	0.0126	001	40,016	503
002	Other grain	007A	Other grain	00210	601	5,216	0.1152	002	5,012	577
				00230	951	5,216	0.1823	002	5,012	914
				00290	765	5,216	0.1467	002	5,012	735
003	Food crops	002	Cassava							
		004	Sugar cane and beet	00310	5,287	5,398	0.9794	003	4,084	4,000
				00395	111	5,398	0.0206	003	4,084	84
		005	Oil palm and coconuts							
		007B	Other food crops	00220	514	5,216	0.0985	002	5,012	494
				00240	40	5,216	0.0077	002	5,012	38
				00410	4,152	9,037	0.4594	004	8,132	3,736
				00431	1,163	9,037	0.1287	004	8,132	1,047
				00490	647	9,037	0.0716	004	8,132	582
				00495	105	9,037	0.0116	004	8,132	94
				00510	4	6,078	0.0007	005	5,259	3
				00520	377	6,078	0.0620	005	5,259	326
				00530	565	6,078	0.0930	005	5,259	489

2000 Asian I-O		1995 Asian I-O		1996 TIO (596 sectors)				1999 TIO (160 sectors)		
Code	Description	Code	Description	Code	Value	Value (total)*	Ratio	Code	Value (total)*	Value*
				00540	108	6,078	0.0178	005	5,259	93
				00590	4,403	6,078	0.7244	005	5,259	3,810
				00595	621	6,078	0.1022	005	5,259	537
				00610	52	4,439	0.0117	006	4,681	55
				00620	711	4,439	0.1602	006	4,681	750
				00630	3,660	4,439	0.8245	006	4,681	3,860
				00695	16	4,439	0.0036	006	4,681	17
				00730	0	7,948	0.0000	007	9,694	0
				00790	189	7,948	0.0238	007	9,694	231
				00795	321	7,948	0.0404	007	9,694	392

Source: 1. IDE, Jetro, 2001.

2. IDE, Jetro, 2003.

3. DGBAS, 2000a.

4. DGBAS, 2002b.

Note: The unit for values is million NT dollars.

5. SOME REMARKS

In this section, we shall make some remarks.

- The concordance is only for converting a 596×596 TIO table to a 76×76 TIO table; however, we only have 596×160 and 160×160 tables. It would be a challenge to make them related and then transform the later to the former. If we use Microsoft Excel for the transformation, combining rows and columns of a product matrix together is certainly a tedious job. We thus use other software, which can deal with matrix algebra, to make the combinations easier.
- Some classifications in the concordance may be different from year to year. We need to update the information before we construct the next AIO table. For the sake of consistency, we hope that there will be a unified classification that can be used in future research.
- Since there might be some problems in classification, we encountered negative export

items in some parts of the 76 sectors. To solve this problem, we have checked every sector again and matched the data from the original TIO table and the data from Foreign Trade Statistics. We then reproduced the TIO table and have now obtained a reasonable import table.

- We separated territorial export and nonterritorial export from the total export. Nonterritorial export was considered as export to R.O.W.
- For the sake of consistency, we have checked the import and the export part. For instance, the import value from Japan to Taiwan should be equal to the export value from Japan to Taiwan after adjusting for the trade and transportation margins.
- The data we used to estimate and update is from the 1996 and 1999 TIO tables, and the 2000 national income statistics. The 2001 TIO table was published by DGBAS in November 2004. However, considering the schedule of compiling the AIO table, we did not adjust our estimation for the 2000 TIO table by using 2001 TIO table.

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Appendix

Table A-1: Taiwan's Export Data for the Year 2000, by Commodity and Destination

Unit: NT\$10,000

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
1	44	0	0	0	0	0	0	10,092	3	19	0	33,612	43,770
2	0	0	0	0	0	0	0	634	109	219	3	2,691	3,656
3	290	771	1,152	7,138	1,552	7,597	2,164	187,276	11,185	16,384	2,951	94,245	332,706
4	1,315	1,077	156	7,026	5,898	9,374	29,548	79,421	33,061	22,417	14,979	912	205,184
5	25	612	28	1,233	2,401	56	200	3,928	3,594	2,233	5,308	11,436	31,055
6	172	2,642	78	278	521	1,880	290	10,879	1,162	40,671	559	1,264	60,395
7	41	1,955	1,237	2,576	100	1,062	33,886	462,386	11,254	21,202	559	2,984,235	3,520,490
8	0	0	0	18,220	0	0	0	0	0	0	78	108	18,406
9	0	19	0	0	0	0	0	0	0	0	0	12	31
10	240	119	315	44	571	16	353	9	0	1,770	0	145	3,583
11	7,641	5,411	4,356	1,077	3,110	5,830	915	20,449	1,009	43,100	1,152	13,944	107,994
12	0	37	0	0	25	0	0	0	59	734	0	90,861	91,717
13	15,085	7,026	24,990	77,445	177,971	1,190	57,120	1,826,599	473,346	62,660	72,165	8,892	2,804,487
14	353	490	821	331	674	3,813	1,315	3,944	1,193	84,424	184	66,097	163,638
15	14,732	93,123	25,077	89,866	12,852	2,857	33,108	730,735	395,274	176,894	50,051	768	1,625,337
16	640	10,804	1,371	18,173	2,520	509	13,642	38,163	50,550	77,710	20,399	191	234,674
17	0	0	1,268	0	0	212	212	409	3	1,361	9	20,449	23,924
18	66,738	16,774	57,845	5,455	59,372	46,079	152,363	227,963	17,570	1,153,821	45,679	14,278	1,863,937
19	958,567	345,688	723,113	169,225	704,981	316,080	416,856	524,330	690,330	7,543,178	759,519	5,103,893	18,255,760
20	411,576	213,537	449,808	350,159	208,740	115,355	107,330	191,048	3,452,573	2,035,924	1,044,161	3,582,456	12,162,669

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
21	3,441	3,631	1,233	15,984	347	1,421	5,037	59,013	2,351,023	55,540	335,818	27,887	2,860,375
22	142,424	73,286	119,799	79,655	119,062	66,363	27,078	318,300	1,917,405	1,286,728	511,250	1,351,874	6,013,225
23	49,136	5,243	42,978	14,251	49,495	109,760	23,072	91,212	106,506	1,918,557	183,208	499,090	3,092,508
24	1,717	4,103	1,237	5,823	406	7,325	578	78,622	1,005	83,637	8,830	39,650	232,934
25	10,145	7,357	23,572	25,011	10,638	10,208	9,926	537,389	1,479,953	75,040	281,839	326,896	2,797,974
26	5,112	5,024	3,575	14,432	4,696	11,862	4,350	227,138	355,227	103,287	110,984	46,672	892,360
27	45,907	233,611	132,957	62,197	83,524	95,680	51,971	141,613	118,125	1,246,095	69,039	286	2,281,006
28	12,634	15,990	17,998	22,885	12,937	14,351	7,126	47,437	104,376	218,489	58,357	801	533,381
29	105,544	51,756	122,409	4,899	39,743	375,889	63,406	38,988	253,892	876,741	200,044	8,236,284	10,369,596
30	429,443	461,602	271,466	173,646	589,825	3,743,311	490,161	1,031,200	594,237	6,993,948	676,088	81,787	15,536,715
31	7,360	11,391	10,548	1,112	47,063	518	4,197	105,398	1,333	35,459	16,674	723	241,775
32	4,159	19,869	10,563	7,179	8,434	422	21,018	116,120	38,638	79,349	24,852	39,055	369,658
33	242,061	215,560	187,885	110,306	217,427	279,209	141,622	740,053	343,352	2,926,935	273,589	1,014,685	6,692,685
34	19,378	40,768	31,044	183,860	6,470	56,130	186,942	119,552	3,563	673,225	4,840	1,770,110	3,095,882
35	335,224	248,774	322,257	290,635	416,944	432,869	144,707	1,623,173	3,091,304	5,722,480	1,360,114	2,077,426	16,065,907
36	1,021	3,491	5,770	3,575	1,911	1,084	3,778	94,756	478,642	8,815	327,156	547,896	1,477,895
37	43,928	85,985	19,556	22,145	62,169	381,722	20,253	184,800	370,303	773,270	210,021	9,890	2,184,041
38	3,760	10,710	82,291	49,339	637	5,439	2,101	27,506	7,307	37,186	300	1,014	227,590
39	27,712	14,298	33,942	59,868	54,703	99,930	178,749	377,328	278,004	595,911	322,634	1,086	2,044,166
40	48,177	22,582	30,045	31,528	29,217	14,504	22,438	123,895	226,867	270,410	97,741	183,088	1,100,494
41	258,201	757,333	247,232	182,817	384,020	656,772	429,821	1,335,546	1,914,239	5,899,611	853,531	7,591,152	20,510,276
42	36,583	115,443	124,204	242,489	108,217	221,362	117,750	641,559	384,507	2,680,637	238,595	3,799,033	8,710,379
43	225,280	475,029	264,003	403,411	399,992	400,032	99,811	2,319,114	9,011,702	3,731,124	3,585,427	33,956	20,948,882
44	5,873	6,913	5,065	3,066	9,321	2,070	3,619	7,088	2,392	46,101	3,834	31,920	127,263
45	152,947	512,743	184,235	330,063	404,182	432,909	347,090	1,212,696	3,511,143	4,166,975	1,827,511	5,747	13,088,241

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
46	120,960	308,524	53,064	158,149	218,364	257,858	140,329	369,866	2,757,797	1,890,592	2,026,722	104,083	8,406,308
47	554,097	596,036	202,267	223,382	576,389	558,313	219,994	827,515	2,198,273	4,431,081	723,919	4,646	11,115,912
48	28,718	83,780	62,894	202,417	115,496	94,388	144,092	507,965	3,357,867	785,123	711,875	10,826	6,105,442
49	99,209	190,970	69,826	504,437	89,160	73,663	443,785	1,320,261	5,713,790	1,429,508	2,779,361	5,493,520	18,207,491
50	25,886	436,809	116,932	888,866	113,632	208,519	527,590	9,084,135	16,399,360	2,165,611	13,859,730	24,413,240	68,240,309
51	66,588	2,389,062	2,830,655	8,072,966	671,410	950,679	4,031,667	9,492,554	8,429,236	15,897,892	6,793,033	29,953	59,655,696
52	222,336	2,681,804	1,788,451	3,041,082	1,455,553	2,220,258	2,881,746	9,373,693	23,131,219	13,803,259	18,930,899	244,539	79,774,839
53	53,348	65,295	43,406	94,712	58,400	82,147	35,281	562,060	952,790	351,012	478,261	1,338	2,778,051
54	10,414	31,000	130,540	44,755	19,213	34,944	22,813	254,220	1,148,738	263,538	552,511	5,394,453	7,907,139
55	262,966	105,151	278,626	107,115	74,578	444,825	13,539	623,879	2,460,199	223,916	714,842	1,021,281	6,330,917
56	62,772	19,032	54,269	5,517	6,763	4,365	8,119	137,850	417,562	304,652	760,805	942,457	2,724,164
57	1,290	590	2,870	206,814	1,758	1,024	104,820	34,114	429,125	22,360	630,299	532,241	1,967,304
58	32,608	20,902	46,732	30,747	36,790	100,473	21,424	675,351	1,785,963	626,312	2,512,302	1,236,692	7,126,296
59	28,974	88,202	53,870	159,414	71,559	92,758	108,929	880,101	2,727,090	1,664,459	1,503,412	166,311	7,545,079
60	109,282	94,219	100,589	143,614	209,646	61,873	189,784	1,696,624	4,146,850	1,621,431	2,314,780	854,420	11,543,112
61	0	0	0	0	0	0	0	0	0	0	0	48,114	48,114
62	0	0	0	0	0	0	0	0	0	0	0	8,266	8,266
63	0	0	0	0	0	0	0	0	0	0	0	541,133	541,133
64	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	28,078,829	28,078,829
66	0	0	0	0	0	0	0	0	0	0	0	30,658,905	30,658,905
67	0	0	0	0	0	0	0	0	0	0	0	1,744,640	1,744,640
68	0	0	0	0	0	0	0	0	0	0	0	1,769,440	1,769,440
69	0	0	0	0	0	0	0	0	0	0	0	2,226	2,226
70	0	0	0	0	0	0	0	0	0	0	0	90,931	90,931

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
71	0	0	0	0	0	0	0	0	0	0	0	137,244	137,244
72	0	0	0	0	0	0	0	0	0	0	0	2,465,197	2,465,197
73	0	0	0	0	0	0	0	0	0	0	0	4,469,488	4,469,488
74	0	0	0	0	0	0	0	0	0	0	0	10,425,177	10,425,177
75	0	0	0	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0	3,107,647	3,107,647

Table A-2: Taiwan's Import Data for the Year 2000, by Commodity and Origin

Unit: %

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
1	0.00	0.00	0.00	0.00	47.73	0.00	0.00	0.00	30.68	0.00	0.00	21.59	100.00
2	0.00	0.00	0.00	0.00	0.50	0.28	0.00	0.00	95.32	0.00	0.01	3.89	100.00
3	1.17	1.05	0.02	0.03	1.58	3.24	0.03	0.49	75.46	0.04	1.96	14.93	100.00
4	3.33	2.10	0.47	0.02	8.37	5.09	0.12	1.35	27.91	0.09	0.40	50.76	100.00
5	0.07	0.03	0.06	0.00	0.49	0.30	0.19	0.37	8.64	0.01	3.32	86.52	100.00
6	4.82	54.36	0.10	0.03	0.16	2.04	0.00	0.31	8.64	0.00	4.07	25.47	100.00
7	6.94	0.45	0.96	0.23	10.10	11.09	2.22	4.80	11.54	5.42	1.88	44.36	100.00
8	10.56	5.90	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.32	83.03	100.00
9	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	99.96	100.00
10	0.00	2.31	0.15	0.00	0.03	7.10	0.00	0.67	1.20	0.00	0.93	87.60	100.00
11	19.61	0.17	0.40	0.00	0.46	20.66	1.86	1.96	4.56	0.14	1.72	48.47	100.00
12	2.74	1.04	0.00	11.29	4.91	0.19	0.48	4.72	50.06	0.00	11.75	12.80	100.00
13	1.44	0.30	0.40	0.17	4.46	0.80	1.56	3.55	25.00	0.37	1.50	60.44	100.00
14	0.26	0.12	0.20	0.14	0.17	0.36	0.07	2.69	38.54	0.33	16.63	40.50	100.00
15	2.05	3.27	1.06	1.43	12.64	2.52	1.84	8.22	21.94	1.03	10.03	33.96	100.00
16	0.34	1.42	0.78	1.26	2.13	0.36	0.84	15.42	11.31	0.05	57.52	8.58	100.00
17	0.01	0.39	0.01	0.24	0.72	0.00	0.01	31.96	9.68	0.00	47.82	9.16	100.00
18	12.21	16.49	0.11	2.75	6.52	1.29	4.42	6.61	3.58	0.12	4.17	41.71	100.00
19	7.43	2.55	1.61	5.48	2.92	5.66	18.02	25.62	6.59	1.55	12.50	10.07	100.00
20	2.55	0.59	0.46	0.38	3.13	3.96	7.07	9.57	1.89	38.51	16.06	15.83	100.00
21	0.90	0.80	1.02	0.16	1.78	4.59	3.71	12.76	1.00	38.27	20.86	14.16	100.00

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
22	3.18	0.74	0.48	0.17	6.23	12.15	7.06	18.01	9.60	7.12	21.96	13.31	100.00
23	2.46	0.21	0.75	1.04	7.68	14.01	1.31	1.75	19.12	3.87	25.41	22.38	100.00
24	20.40	22.14	0.22	0.08	1.90	10.49	0.04	0.43	9.63	0.00	3.06	31.61	100.00
25	6.92	6.39	0.52	0.82	0.95	35.19	0.29	4.40	4.16	2.36	19.46	18.54	100.00
26	37.94	18.68	0.08	0.33	4.52	12.93	0.70	1.81	1.77	0.30	8.97	11.96	100.00
27	8.91	0.30	1.12	0.14	3.21	3.07	3.26	13.15	18.05	0.30	18.65	29.84	100.00
28	0.13	0.39	0.16	5.00	0.37	3.01	1.58	18.46	34.88	18.98	14.41	2.60	100.00
29	8.29	5.39	0.04	0.00	1.21	2.20	11.24	23.59	13.83	0.18	23.00	11.02	100.00
30	1.68	0.90	0.17	4.35	2.63	2.71	10.05	30.82	22.32	0.09	12.65	11.64	100.00
31	8.89	0.72	0.00	1.54	0.82	1.79	2.91	14.63	25.96	0.02	23.82	18.90	100.00
32	0.39	0.92	0.05	1.55	0.96	4.90	2.15	9.59	20.82	0.16	42.39	16.12	100.00
33	1.07	3.01	0.51	2.77	1.05	2.29	3.84	43.31	19.01	0.48	15.83	6.82	100.00
34	5.65	2.52	0.19	27.56	0.82	1.38	20.38	3.38	2.64	0.07	2.48	32.91	100.00
35	1.33	2.80	0.32	0.77	1.39	9.85	6.51	38.82	20.72	2.79	10.61	4.09	100.00
36	3.40	0.90	2.18	0.00	8.55	2.58	10.92	44.61	2.03	0.00	21.13	3.70	100.00
37	0.17	2.69	0.02	0.64	1.97	6.75	5.63	48.73	15.10	0.25	13.76	4.30	100.00
38	1.24	0.04	13.30	0.00	1.26	1.84	9.81	56.61	2.24	0.05	7.35	6.25	100.00
39	2.01	1.22	0.08	0.93	2.52	2.86	9.26	60.64	9.53	0.24	8.91	1.80	100.00
40	1.37	2.46	1.82	0.14	3.63	6.38	4.33	34.57	9.52	0.81	29.62	5.35	100.00
41	0.39	0.09	0.12	0.07	0.65	12.79	4.19	29.12	3.63	0.42	9.13	39.40	100.00
42	2.32	1.92	0.54	1.05	0.88	9.00	3.10	16.76	6.52	4.83	5.32	47.76	100.00
43	0.70	1.60	0.31	1.36	0.89	7.22	7.72	43.23	15.20	1.58	13.82	6.36	100.00
44	0.14	0.03	0.01	0.14	0.25	0.49	12.25	17.84	35.09	0.00	29.04	4.73	100.00
45	0.33	1.11	0.46	1.60	1.22	9.03	2.91	44.90	19.10	0.76	15.34	3.26	100.00
46	0.41	0.30	0.08	7.48	0.05	5.35	1.23	45.86	13.98	1.56	15.44	8.26	100.00

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
47	0.08	0.16	0.06	0.60	0.08	0.40	1.25	50.08	31.94	0.37	12.04	2.95	100.00
48	0.84	0.97	0.57	2.41	1.22	18.00	1.78	36.98	11.25	3.15	17.79	5.03	100.00
49	0.64	8.19	2.53	14.59	0.83	7.00	13.48	10.43	12.70	1.08	24.05	4.48	100.00
50	3.83	6.03	15.05	10.81	15.77	4.14	3.48	25.04	8.75	0.35	3.14	3.62	100.00
51	0.31	11.05	9.42	8.07	3.01	1.37	10.44	18.76	19.15	2.24	8.65	7.53	100.00
52	0.16	3.80	3.88	2.18	1.44	7.47	19.19	45.23	7.81	2.51	3.21	3.12	100.00
53	2.65	0.72	2.33	0.73	7.44	10.51	16.21	34.39	11.32	1.60	9.47	2.64	100.00
54	1.28	2.70	0.63	1.22	0.72	9.98	2.77	52.73	5.49	0.92	7.92	13.65	100.00
55	0.83	0.65	0.59	0.06	0.44	0.63	3.92	51.95	8.30	0.02	28.28	4.34	100.00
56	0.28	0.06	0.00	0.08	0.28	12.72	0.60	73.57	1.40	0.03	10.15	0.82	100.00
57	0.00	0.05	0.02	1.73	0.01	1.35	16.72	45.60	9.84	3.71	18.50	2.48	100.00
58	0.08	1.37	0.01	1.22	0.08	5.79	0.11	6.24	72.45	0.02	8.17	4.47	100.00
59	0.09	0.66	0.14	0.73	0.14	1.44	1.29	39.93	32.43	0.64	17.24	5.27	100.00
60	0.54	0.92	0.14	3.79	1.71	17.50	1.23	17.04	16.31	6.93	24.49	9.41	100.00
61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sector	Indonesia	Malaysia	Philippines	Singapore	Thailand	China	Korea	Japan	U.S.A.	H. K.	EU15	R.O.W	Total
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

THAILAND

Supply & Use and Input & Output Section
The National Economic and Social Development Board

1. INTRODUCTION

1.1 Brief history of the national I-O table

The Thailand Input-Output Table is compiled every five years. The first official Input-Output Table was for the year 1975 and was compiled by Office of the National Economic and Social Development Board (NESDB) with the cooperation of the Social Research Institute, Chulalongkorn University, the National Statistical Office (NSO), and the Institute of Developing Economies (IDE, Japan). The table was created with comprehensive methodology, and the size was 180 x 180 sectors of interindustrial linkage. It was the first table formally published.

The 1980 Input-Output Table was constructed with a shortcut method of updating from the 1975 Input-Output Table. The 1980 table used supporting data from the Thailand National Income Accounts and also applied case-study reporting, including a special survey with 1,000 samples. The original table size was 180 x 180, and it was also provided as 58 x 58, 26 x 26, and 16 x 16 concise tables. The 1982 Input-Output Table was also constructed with a short-cut method, and the size was 180 x 180. This specific table disaggregated energy, vegetable oil, and animal feed. It was used for economic modeling for vegetable oil, animal feed, and related industries.

The 1985 Input-Output Table was constructed with a comprehensive method, and the size was 180 x 180. The objective was to cover new products, such as natural gas. The 1989 Input-Output Table was informally constructed with a short-cut method and in a specific of size 27 x 27. The table was used for economic modeling in formulating the Seventh National Economic and Social-Development Plan.

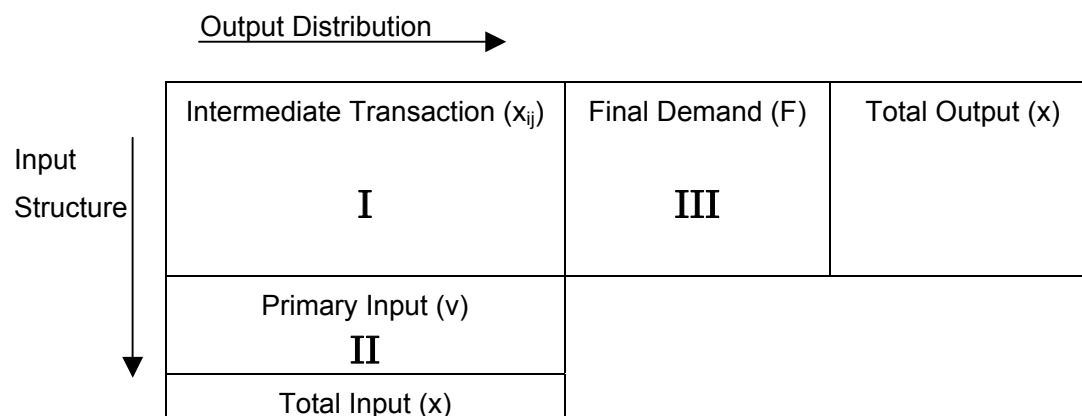
The 1990 Input-Output Table was constructed with a semi-comprehensive method. The objective was also to cover new products emerging during the five-year period and update for input structure, technological change, and output distribution in each sector. The sizes of tables were 180 x 180, 58 x 58, 26 x 26, and 16 x 16, including inverse-matrix and analytical tables.

The 1995 Input-Output Table was also constructed with a semi-comprehensive method, with 180 x 180, 58 x 58, 26 x 26, and 16 x 16 sectors as well. The objective was to add new products from 1991 to 1995. The 1998 Input-Output Table was constructed by a semi-comprehensive method with sizes of 180 x 180, 58 x 58, 26 x 26, and 16 x 16. The objective was to enable tracking of structural changes of goods and services during periods of economic crisis. In 2004, NESDB completed the latest table, the 2000 Input-Output Table.

In addition, NESDB and IDE conducted joint research in compiling the Thailand-Japan Bilateral Input-Output Tables for 1975, 1980, 1985, and 1990 and the multilateral input-output tables (Asian Input-Output Tables) for 1985, 1990, 1995 and 2000. Moreover, NESDB and IDE had another joint project in compiling the Energy and Environment Input-Output Table for Thailand. This project was aimed at studying the changes in energy demand and supply structure, as well as environmental problems, including carbon dioxide and sulfur dioxide emissions.

1.2 Features of the national I-O table

The Input-Output Table of Thailand shows the linkages among the various economic activities. Each industry can sell its products to other industries as materials or inputs. Apart from selling as inputs, each industry can sell its products to households, the government, and foreign countries (called the final-demand sector). Thus, the distribution of goods and services can be classified into two categories: intermediate demand and final demand. The linkages of various economic activities (interindustrial transactions) can be shown in a basic structure of an input-output table as follows.



The input-output structure consists of three main parts. The first is called intermediate inputs or intermediate transactions, the second is primary input or the value-added part, and the third is final demand. In the National Input-Output Table of Thailand, all economic activities are aggregated into 180 sectors according to 3-digit I-O codes from 001 to 180. Moreover, the primary inputs consist of four items: wages and salaries, operating surplus, depreciation, and net indirect taxes. The final-demand part is separated into six categories: private-consumption expenditures, government expenditures, fixed-capital formation, increase in stock, and exports, and special exports. The intermediate-transaction part is a square matrix of 180 x 180 sectors. The primary-input part is a rectangular matrix of 4 x 180 sectors, and the final demand-part is a rectangular matrix of 180 x 6 sectors.

The National Input-Output Table of Thailand is presented in monetary terms (Thai baht). Along the column, it explains the input structure of each economic activity, including purchase of goods and services from other activities, using as intermediate inputs in the process of production and also primary inputs or value added. Along each row, it presents output distribution or the flow of goods and services from one industry to other industries, using intermediate input in the process of production, and also to final-demand consumption.

There are two types of input-output Tables of Thailand.

(1) The Input-Output Table at purchasers' prices

In this table, every cell of transaction value is at purchasers' prices, which includes trade margin and transportation cost. The transaction values at purchasers' prices are the original values obtained from questionnaires. Normally, the input structure of receiving from a factory is presented in purchaser's price.

(2) The Input-Output Table at producers' prices.

This table contains the value of production at producers' prices, which we call ex-factory prices. The value of production at producers' prices excludes trade margin and transportation cost. Thus, to construct the Input-Output Table according to producers' prices, it is necessary to construct some supporting matrices that include the following:

- Wholesale trade margin matrix
- Retail trade margin matrix
- Transportation cost matrix

To create a producer-price input-output table, it is necessary to subtract wholesale trade margin, retail trade margin, and transport cost out of the purchaser-price input-output table.

2. ESTIMATION WORK

2.1 Control Totals (CT)

Gross output of industries covers the value in the market of goods and services produced, including work in progress and products for own use. Valuation is usually at producers' prices. The imputed rent of owner-occupied dwellings is also included.

2.1.1 Agriculture, hunting, forestry, and fishing

The activities in this sector are presented in the following subgroups:

- Crops
- Livestock
- Agricultural services
- Forestry
- Fishing

Separate production accounts are prepared for each of the above subgroups. The methodology adopted varies with the source of information.

Crops

A wide variety of crops are produced, for which estimation of gross output by quantity and price is done separately. Area harvested was obtained from the survey of the Office of Agricultural Economics (OAE), MOAC. The estimates of gross output of fruits, vegetables, and flowers were made on the basis of consumption data collected through

the Household Socioeconomic Survey and export data from foreign-trade statistics. The prices of crops are collected at ex-farm prices according to a survey conducted by OAE.

Livestock

Total production includes slaughtering, export, breeding, and milk production. The total quantity multiplied by a weighted average ex-farm price yields gross output at producers' prices (from information obtained from Department of Livestock, MOAC).

Agricultural Services

Gross output was derived from statistics obtained either from published reports by OAE or from direct surveys.

Forestry

Estimates of value of forestry production (wood processed by sawmills and firewood) were made on the basis of information obtained from Department of Forestry, MOAC.

Fishing

The Department of Fishery, MOAC provided data on the quantity of fish caught, which we adjusted on the basis of statistical reports available on the fish market and from cold-storage organizations. Prices were obtained from the office of Agricultural Economics, MOAC.

2.1.2 Mining and quarrying

Estimates of gross output were made based on information collected from the Ministry of National Resources and Environment (MORE) and Ministry of Energy.

2.1.3 Manufacturing

Gross output was derived from sales figures, and estimates of production value were made by multiplying quantity by ex-factory prices obtained from MOID, MOC, and BOT statistics. For some industries, indicators available on employment, imports of raw materials, value-added tax, and exports of finished goods were used.

2.1.4 Electricity, gas, and water

This sector covers the activities of state-owned enterprises and private enterprises. The gross output of state-owned enterprises was obtained from data on financial-report accounts. Private-sector data came from questionnaires and financial reports submitted to the Securities and Exchange Commission and the Stock Exchange of Thailand.

2.1.5 Construction

The construction industry consists of activities related to the following:

- Residential building construction
- Nonresidential building construction
- Public works for agriculture and forestry
- Nonagricultural public works
- Construction of electric power plants
- Construction of communication facilities

The gross output of the construction industry is the value of investment in residential and nonresidential buildings, roads, electric-power and communications networks, land improvement and reclamation, maintenance and repair works, etc. The estimation methodology adopted varied with the type of construction and sources of statistical information.

The main source of data was the records of building permits kept by the Ministry of the Interior and local governments. The total volume (floor area) of building construction, whether built by contractors or individuals, was compiled at our office from these records.

A few small-scale contractors were interviewed, to discover the prices charged per square meter for the construction of dwellings and the breakdown by labor and materials. These prices vary with the size and location of the building. In addition, large-scale builders and contractors were surveyed, to learn values of projects completed during the year. Supplemented with investment statistics collected for the computation of the fixed-capital formation, we estimated gross output of the private sector.

Data on value of public construction works were gathered by the Ministry of Agriculture and Cooperatives, the Ministry of Communication, state-owned enterprises, and local governments. These data were used to evaluate gross output with regard to construction in the public sector.

Another element of the construction industry is the repair and maintenance of buildings, both residential and nonresidential, performed by various contractors and public authorities. Estimates for this were made from benchmark data on repairs and maintenance expenses by households from the Household Socioeconomic Survey.

2.1.6 Wholesale and retail trade

The gross output for wholesale and retail trade was estimated as the gross margins obtained between sale and purchase values of goods sold. These can be in categories: imported goods and locally manufactured goods.

The basic data used for the computation of wholesale and retail margins on imported goods were obtained from the annual tabulations on imports and for each item for which figures for quantity, CIF value, tariffs, and duties are available.

For locally manufactured goods, wholesale and retail margins were estimated, using the commodity-flow approach. The volume and value of goods manufactured were obtained from the annual Manufacturing Industry Survey and Business Trade and Services Census, conducted by NSO. These products are valued at producers' prices and also at retail prices, collected by MOC. The difference between the two values yields gross output.

For agricultural products a similar approach was used. The main source of data was the Agricultural Census, conducted by NSO.

2.1.7 Hotels and Restaurants

Data on the number of room-nights/bed-nights spent during the year, collected from the Ministry of Tourism, were used as leading indicators for activities of the hotel industry. Making use of these indicators and estimates of tourism earnings obtained from the Bank of Thailand, we worked out the production account of the hotel industry, using working percentages (gross output/intermediate consumption, value added/gross output, etc.) obtained from the Hotel Survey, conducted by NSO.

The total number of restaurants and cafes operating was obtained from the registry of license holders of MOC based on data from local authorities. Estimates of gross output, intermediate cost, and value added per restaurant were made, based on percentages worked out from the Business Trade and Services Survey, conducted by NSO, and supplemented with information collected from personal interviews with owners of a few restaurants and cafes.

The aggregates compiled for this sector were checked for consistency with other available sources. Total receipts of hotels and restaurants were compared with the percentage of earnings from tourism. Expenditure patterns of tourists were compared with data from the survey of outgoing tourists conducted jointly with the Ministry of Tourism.

2.1.8 Transport, storage, and communication

This group covers a wide range of activities grouped under the following:

- Land transport
- Water transport
- Services that support transport, such as cargo handling, ports and airport services
- Travel agencies, storage, and warehousing.
- Air transport
- Communication services

Land transport: The enterprises in this activity group consist of operators of railways, buses, lorries, vans, hired cars, and taxis.

The data on gross output of railway transport came from financial accounts of state-owned enterprises.

The gross output of buses, lorries, taxis, etc. were estimated indirectly. The total numbers of buses, lorries and hired cars operating, obtained from MOT, provide leading indicators. The large-scale establishments (companies that operation buses, lorries, and hired cars) were interviewed by mail questionnaire, and the resulting working percentages were applied in estimating gross output.

A similar method was used to estimate the gross output of taxis and vans. Information on income and expenditures per vehicle was obtained in personal interviews of taxi and van owners. The estimates of gross output for buses and taxis were cross-checked with data on consumption obtained from the Household Socioeconomic Survey.

Water transport: Ship owners and shipping agents were interviewed by mail questionnaire. As very little information was obtained from this source, indirect methods were used to estimate output. Indicators, such as volume of goods loaded and unloaded and statistics on movement of ships were used.

Services that support transport

Most enterprises engaged in these activities employ more than 10 persons. This sector covers mainly activities of ports and airport services, as well as storage and warehousing. Information on these services was required for the estimation of gross output. Information on the operations of large travel agencies, forwarding agencies, and tour operators was obtained directly from inquiries made annually and indirectly from figures on expenditures of tourists.

Air transport

The main enterprise engaged in this activity is Thai Airways International, which provided data through a mail questionnaire to enable us to work out the production accounting for this sector.

Telecommunication services

The main contributor was the Thai Telecommunications and survey questionnaire, which is sent out annually to obtain information on input and output. All the other establishments engaged in telecommunication services are state-owned enterprises.

This activity group also includes the Posts and Telegraph Department. The Financial Report and the monthly abstracts of accounts prepared by state-owned enterprises were used to compile the required statistics.

2.1.9 Financial institutions

The activities in this group can be categorized into three subgroups: the banking sector, other financial institutions, and financial services.

Banking sector

The gross output on the activities of this subgroup, comprising mainly of Bank of Thailand, commercial banks, and other financial institutions, were obtained from BOT.

In summary, the output was measured as

$$\begin{aligned} &+ \text{Interest income receivable} - \text{Interest payable} \\ &= \text{Imputed bank service charges} + \text{actual service charges} \end{aligned}$$

Other financial institutions

The gross output from the activities of this subgroup, comprising mainly saving & loan companies, development banks, and other financial institutions, were obtained from BOT.

In summary, the output was measured as

$$\begin{aligned} &+ \text{Interest income receivable} - \text{Interest payable} \\ &= \text{Imputed bank service charges} + \text{actual service charges} \end{aligned}$$

Financial services

The gross output from the activities of this subgroup, comprising mainly commodity and bullion exchanges, investment research, security and commodity brokerage services, etc. were obtained from BOT.

2.1.10 Life and nonlife Insurance

Data on production accounts of insurance companies are available from a report from the Department of Insurance, MOC

The gross output of insurance enterprises was calculated as:

- + Total premiums earned
- + Total premium supplement (interest, dividends, and rent)
- Claims due – changes in actuarial reserves
- = Output of services to policyholders + commission fees explicitly charged

2.1.11 Real estate, rental, and business activities

Real estate and rentals

This group comprises the actual and imputed rent of owner-occupied dwellings as well as activities of agencies involved in the sale of property.

The stock of dwellings, distributed by size and region, was obtained from the Housing and Population Census, NSO. These benchmark data were updated, using the number of building permits issued every year by local authorities and data from the Ministry of the Interior. Information on rent paid, by size, for dwellings was obtained from the Quarterly Rent Survey, conducted by this office. These rents, the total number of residential buildings, and the current market value of the existing stock of dwellings were used to arrive at a figure for imputed rent, to which actual rent paid for nonresidential buildings was added. Data on rent paid were obtained indirectly from the value-added tax revenue report and returns of establishments surveyed by this office. The total yields the gross output of activities classified as real estate.

Business services

The activities of this sector are broadly classified into two main components:

- (a) Activities of business enterprises, such as consulting firms, engineering firms, advertising agencies, computer firms, accounting firms, and other services, such as car and machine rental and photographic activities
 - (b) Activities of professional workers such as lawyers, accountants, notaries, surveyors, etc.
- For the first category, the large contributors to output are interviewed by mail questionnaires annually. Estimates were made for the nonrespondents and small firms,

using benchmark data collected through the Business Trade and Services Survey, conducted by NSO.

For the second category, the income approach was used to estimate value added, which consists of compensation of employees and operating surplus. The estimates are based on rates obtained from the Business Trade and Services Survey, conducted by NSO.

2.1.12 General Government

The general government sector is subdivided into the central government and local government. It consists of all government units and all nonmarket, nonprofit institutions that are controlled and mainly financed by government units.

The central government is generally composed of ministries/departments operating under the authority of the central government, each with a separate legal identity and authority to form additional government units. Local governments are municipalities and district councils, mainly financed by the central government.

The main functions of government are to assume responsibility for the provision of services to the community as a whole (collective services) as well as certain individual services (e.g., education and health). Government units are normally engaged in the production of nonmarket goods and services.

Gross output = Compensation of employees + consumption of fixed capital

The government accounts are prepared by the Office of the Comptroller-General, MOF. All units forming part of general government are classified according to ISIC group. The main ISIC groups are Public Administration and Defense, Compulsory Social Security (which consists of the executive and legislative administration directly dependent on the head of state), and Parliament, together with all other central and local government bodies, the regulation of the activities of agencies that provide health care, education, cultural services and the provision of services to the community as a whole (foreign affairs, defense, public order, and compulsory social security activities).

Activities other than administration are classified in their appropriate ISIC groups; e.g., education activities are classified under Education, and human-health activities are classified under Health activities.

2.1.13 Education

Educational services are provided by both the public and private sector. The data on revenues and expenditures incurred by the Ministry of Education were extensively used to estimate output of educational activities in the public sector (government preprimary, primary, and secondary schools).

Output for the private educational institutions was estimated from data on enrollment (from the Ministry of Education) and school fees (special inquiries).

2.1.14 Health and social work

Like educational services, public health services are provided both by the public and private sectors. Output of public health services was measured as cost from data available from the MOF.

For private health services, a number of sources were tapped to obtain relevant data and leading indicators (registry of license holders, associations of dentists and physicians, and employment data from the Business Trade and Services Survey, conducted by NSO). The benchmark data used came from the Household Socioeconomic Survey, conducted by NSO.

Annual estimates for private physicians and dentists were calculated, using the number of persons offering private medical services and the average price charged per patient.

Data on health services provided by private clinics, private laboratories, physiotherapy, veterinary, and welfare institutions were obtained through mail questionnaires.

2.1.15 Other community, social, and personal services.

This section, on services not included with the activity groups above, deals mainly with community, social, and personal services. The main services included are sanitary services, activities of religious organizations, recreational, cultural, and sporting activities, and other service activities (such as laundry, hairdressing and beauty treatment, funeral, and domestic services). Income data from the Revenue Department, MOF were used. Data are collected annually through mail questionnaires for establishments that keep proper records and where the information can be readily obtained. For these enterprises, the production approach was used for measuring output.

For other enterprises, mostly small, output was measured indirectly, mainly with the income approach. Estimation was based on indicators, such as licenses issued by local governments, employment figures from the Survey of Labor Force, and from benchmark censuses and surveys such as the Business Trade and Services Survey.

2.2 Final Demand

Final demand consists of household consumption expenditures, government consumption expenditures, gross fixed-capital formation, change in stocks, exports, and special exports

2.2.1 Household consumption expenditures

Household consumption expenditures are current expenditures on goods and services by households and private nonprofit organizations. They also cover the expenditures of Thai nationals abroad as tourists and those of the families of foreign nationals who work for private companies or nonprofit organizations in Thailand

The basic data for the estimation of household consumption were collected in sample surveys of the Household Socioeconomic Survey (SES). With this method, per capita consumption of various kinds of goods and services was estimated, while total consumption was obtained by multiplying per capita consumption by total population. For some sectors, for which this method could not be applied, the commodity-flow method was used as a supplementary method.

Data on retail sale statistics obtained from the Ministry of Commerce and the Bank of Thailand were used to estimate the values for consumption

Other sources on household expenditures were reports on agriculture for estimating own-account production and reports of particular establishments, such as those on gas and fuel from the Ministry of Energy, on health from the Ministry of Public Health, on communication from the Ministry of Information and Communication Technology, etc.

2.2.2 Government consumption expenditures

This category covers all current expenditures of governments for goods and services, including those for the police and military forces. Expenditures of the Royal Household

are also included. However, consumption expenditures of profit-making state-owned enterprises are not included.

Data on government consumption expenditures were collected from reports on government budgets and expenditures, which were provided by the Ministry of Finance.

2.2.3 Gross fixed-capital formation

Gross fixed-capital formation includes fixed assets such as land, buildings, machinery, and equipment belonging to households, governments, or private enterprises, except those for military use. Public infrastructure, such as roads, dams, and power plants, are also included. However, installation costs of equipment and machinery are not covered.

Data on private construction were collected from records on building permits (preferentially on works completed), which were provided by the National Statistic Office, and estimated from construction material prices, as published by the Bureau of Trade and Economic Indices, Ministry of Commerce.

Data on private plants, structures, equipment and other capital expenditures were obtained from reports from the Bank of Thailand, production surveys from state-owned enterprises, and import statistics that were published by the Customs Department.

Data on capital formation of government and nonprofit institutions were obtained from investment report of the Office of the Comptroller-General, Ministry of Finance, and from investment reports from the Bank of Thailand.

2.2.4 Change in stocks

Change in stocks comprise the following: finished products stored in producers' factories or warehouses, unused raw materials purchased by producers, semiprocessed products, products on processing lines, and marketable stocks held by wholesalers and retailers. Stocks retained by households are not included.

Data on change in stock for rice and rubber were obtained from reports on government's rice mortgage scheme and rubber stock provided by the Ministry of Agriculture. Data on others change in stock were obtained from a reconciliation process,

which was the difference between the value of allocated output and the amount of output available.

2.2.5 Exports

Exports at purchasers' prices were valued at f.o.b.. As for producers' prices, exports were valued by subtracting trade margins and transport costs from f.o.b.

Data for export and import values of goods were obtained from foreign-trade statistics by the Customs Department. These statistics must be adjusted to exclude goods in transit and goods that were returned. Export values were classified according to the Harmonized System (HS).

2.2.6 Special Exports

This category covers non-merchandised goods and services not included in the official export statistics. Items included here are freight and insurance related to export, expenditures of foreign tourists in Thailand and related transportation costs, expenditures of foreign government organizations, international organizations and families of diplomats, expenditures of foreign military bases, other service charges paid by foreigners, and estimated smuggling.

Data for export and import values of services were obtained from *Balance of Payments*, published by the Bank of Thailand. They cover the components of the usage of service facilities provided by Thai people, such as travel, tourism service, transportation service, communication services, and other services. The data on expenditures related to tourism were collected from the report on the Tourist Expenditure Survey, published by the Tourism Authority of Thailand.

2.3 Value Added

The estimate for value added is gross output at producers' prices less the value of intermediate consumption at purchasers' prices according to the input structure survey of input-output 2000. Value added at market prices comprises compensation of employees, operating surplus, consumption of fixed capital, and indirect tax less subsidies.

2.3.1 Compensation of employees

Compensation of employees comprises all payments of wages and salaries by producers to their employees. Payments in kind and contributions to social security, private pension funds, casualty insurance, and similar schemes are also included. Wages and salaries in cash comprise all payments that employees receive for their work (before deduction of employees' contributions to social-security schemes). Payments such reimbursement for work-related travel expenses, commissions, overtime, bonuses, and cost-of-living allowances are also included. Payments in kind include goods and services provided to employees free of charge or at markedly reduced costs that are clearly of direct benefit to the employees as consumers.

Data on compensation of employees are readily available from records of compensation of state-owned enterprises and private enterprise. The compensation of employees of state-owned enterprises came from the budget report and financial report from the Office of the Comptroller-General, MOF, and local government authorities. The estimation for private enterprise was based on financials reports filed with the Securities and Exchange Commission and Stock Exchange of Thailand, questionnaires sent to other enterprises, and indirect calculation by number of employees from the Labor Force Survey, conducted by NSO.

2.3.2 Operating surplus

Operating surplus is defined as the excess of value added over the cost of employees' compensation, depreciation, and net indirect tax.

2.3.3 Depreciation

The value of a fixed asset to its owner at any point of time is determined by the present value of future rentals that could be expected over its remaining service life. The two methods for estimating fixed assets are the straight-line method and the declining-balance method.

2.3.4 Net Indirect Tax

Indirect taxes are those compulsory payments by establishments to governments or international organizations that the establishments treat as part of value added. Common examples are import, export and excise duties, sales taxes, business stamps, and duties.

Subsidies are grants on current accounts that private enterprise and public corporations receive from the government (and represent additions to the receipts of those producers over and above what they receive from sales of their output). Their effect is thus the opposite of that of indirect taxes, and in summary tables subsidies received are often deducted from indirect taxes paid, to yield net indirect tax paid.

2.4 Intermediate Transactions

In the Input-Output Table, column data show cost composition (which is input structure), and row data show demand composition (which is output distribution).

2.4.1 Estimation of Input

The estimation of input reflects cost structure for production. Data for estimating intermediate input of agriculture, hunting, forestry, and fishing were collected from the Annual Survey on Agricultural Products, conducted by the Ministry of Agriculture and Cooperatives (MOAC). Data for estimating intermediate input of mining, manufacturing, and service were collected from the surveys on input conducted for the Input-Output Table 2000 and from the reports and annual surveys of all the ministries involved, as is also the case with estimation of gross output.

2.4.2 Estimation of Output

In estimating output, which is distribution for production, the value for every column sector's demand (which means the row sector's sales to the column sectors) was reckoned, using various demand and supply statistics for each commodity.

2.4.3 Reconciliation of Input and Output

Reconciliation is a process for balancing the supply and demand of each economic sector such that total supply comes out equal to total demand

2.5 Import Matrix

The import matrix is the matrix of imported goods, including import duties and import taxes, treated as noncompetitive imports.

There are two sources of data:

(1) The Field Survey

- The criteria for this survey are the same as for the survey for freight and insurance.
- Economically important industries were selected as survey subjects for the national input-output table.

(2) Customs Department

- Harmonize code: These sectors have heading numbers in 10-digit code, and the goods are classified according to value, quality, and country of origin.

3. RELATED DATA

3.1 Trade margins and domestic transportation costs (TTM)

For estimating trade margins and transport costs, is it very difficult to get reasonably accurate data. The amount of trade margin and transport cost is regarded as the difference for any transaction between purchaser's price and producer's price.

3.1.1 Methodology for estimating trade margin

1. The most convenient way was to obtain data from the Business Trade and Service Survey. That covers the receipts of both wholesale and retail trade, as well as purchases.
2. For input-structure cost, we were able to make estimates after adjusting the trade-margin rate according to the most recent input-output table (based on results from a special I/O survey).
3. For output distribution, we estimated the trade margin in accordance with the results from a special survey of distribution channels.

3.1.2 Methodology for estimating transport cost

1. For input-structure cost, we were able to make estimates after adjusting the transportation-cost rate according to the most recent input-output table (based on results from a special I/O survey).
2. The estimates of output and distribution of railway freight transport are based on annual data reports obtained directly from state-owned enterprises.
3. The estimates of output and distribution of road freight transport are based on statistics on vehicles and lengths of roadway plus a special I/O survey.

4. The estimates of output and distribution of air freight transport cost are based on annual data reports obtained directly from state-owned enterprises.
5. The estimates of output coastal and inland water freight transport cost are based on statistics on vessels plus a special I/O survey..

3.2 Import duties and import commodity taxes

Imports are usually classified into two types: competitive and noncompetitive, the latter being also called complementary imports. Competitive imports include imported products that compete with similar goods produced by the domestic economy. Noncompetitive imports include products that are either not producible or not yet produced in the country. For example, products that can only be grown in a tropical climate are treated as noncompetitive imports by countries with colder climates.

For the Thailand Input-Output Table, import value is treated as noncompetitive. Valuation of imports is CIF plus import duties and import commodity taxes. These data are classified under the harmonized system in 10-digit code then converted to 7-digit I-O code. Import duties and import commodity taxes include import duties, general sales taxes, excise duties, taxes on specific services, profits of import monopolies, and imputed taxes on imports resulting from multiple exchange rates.

Data on import duties and import commodity taxes come mainly from foreign- trade statistics provided by the Customs Department.

3.3 International freight and insurance

The survey on freight and insurance provides basic information on import input, including that for machinery, for selected sectors, particularly in manufacturing, as follows:

- Rates of freight & insurance from countries of origin
- Noncompetitive imports from countries of origin

3.3.1 Sources of data

There are two sources of data:

- (1) The Field Survey was determined based on the following:

- High value of import input: sectors that have value of import input of more than 4,000 million bath
 - High import content percentage: sectors that have average import content greater than 30 percent
- (2) Customs Department
- Harmonized code: sectors that have heading numbers in 10-digit code, whose goods are classified according to value, quality, and country of origin

3.3.2 Sample size

The total sample size is more than 1,100 samples. There are 1,000 samples from the Customs Department and 100 samples from the field survey.

3.3.3 Methodology

- The first 1,000 samples were collected from the Customs Department. They cover most of the range of items with respect to AIO codes.
- The other 100 samples were collected from the field survey.

We designed the questionnaire for the field survey in collaboration with the Industrial Estate Authority of Thailand. Conducting the survey involved field trips, as follows:

- Eastern region: Chonburi, Rayong
- Northern region: Lampoon

The number of companies sampled for the survey in each region was fifty. The survey was conducted by I/O staff, with some face-to-face interviews and some questionnaires sent by mail. We collected and checked the returned questionnaires then edited, updated, and tabulated them and compiled the data.

3.4 Employment matrix

The Thailand Input-Output Tables do not have an employment matrix. It had to be estimated from national labor statistics. The general principle is that the control totals for “Employed,” “Own-account workers,” and “Unpaid family workers” were collected under broader categories of industrial classification, and each of these figures was distributed by AIO sector, using distribution ratios estimated from other sources.

3.4.1 Sources of data

For the calculation of employment control totals (ECTs)

- Report of the Labor Force Survey: Whole Kingdom, Round 3, August 2000"

For the calculation of AIO distribution rates for distributing ECTs

- *Report of the 2001 Manufacturing Industry Survey: Whole Kingdom*
- *Report of the 2000 Business Trade and Services Survey: Whole Kingdom*
- *Report of the 2002 Business Trade and Services Survey: Whole Kingdom*

3.4.2 How to derive the AIO distribution rate

There are eight industrial categories in the Labor Force Survey, and the distribution rate for each category was estimated as follows:

1. Agriculture, forestry, hunting, and fishing
2. Mining and quarrying
4. Construction, repair, and demolition
5. Electricity, gas, water, and sanitary services
7. Transport, storage, and communication

--> Because there were no TSIC-level data, CT shares from the I-O tables were used to obtain the rates.

6. Commerce
9. Activities not adequately described

--> Because there is no further subdivision, the data were directly applied to the corresponding AIO sectors (065 "Wholesale and Retail Trade," 076 "Unclassified").

3. Manufacturing

--> First, correspondence was made between AIO and TSIC in 4-digit code of Table 4 in the *Report of the 2001 Manufacturing Industry Survey: Whole Kingdom*. In cases in which the TSIC classification was not detailed enough to capture an AIO sector, CT shares from the I-O tables were used for subdivision. Then the distribution rates were calculated by dividing each sector figure (AIO) thus derived by its industrial total.

8. Other services

--> For the following AIO sectors, the employment figures were taken directly from information from the relevant organizations, as follows:

- AIO 068: Finance and insurance

The ECT for this sector was taken directly from the information from the Bank of Thailand. There were no data for "Own-account" or "Family unpaid."

- AIO 070: Education and research (public: 90% private: 10%)

The ECT for the public education sector was taken directly from the information from the Office of the Comptroller-General and the Ministry of Education. The ECT for the private education sector was estimated, using the CT rate from the I-O table..

- AIO 071: Medical and health services (public: 65% private: 35%)

The ECT for public medical and health services sector was taken directly from the information from the Office of the Comptroller-General and the Ministry of Public Health. The ECT for private service sector was estimated, using the CT rate from the I-O table. There were no data for "Own-account" or "Family unpaid."

- AIO 075: Public administration

ECT for this sector was taken directly from the information from the Office of the Comptroller-General and Ministry of Finance. There were no data for "Own-account" or "Family unpaid."

- For the rest of the service sector, the ECTs were calculated by subtracting the sums of ECTs of the sectors listed above (068, 070, 071, 075) from the figures given in LFS for "8. Other Services."

For the derivation of distribution rates, correspondence was made between AIO and TSIC in 4-digit code of Table 4 in the *Report of the 2001 Manufacturing Industry Survey: Whole Kingdom*. The estimated figures for 2000, which are missing data, were calculated by taking the average for 1999 and 2001. In cases in which the TSIC classification was not detailed enough to capture an AIO sector, CT shares from the I-O tables were used for subdivision. Then the distribution rates were calculated by dividing each sector figure (AIO) thus derived by its industrial total.

3.5 Others

3.5.1 Domestic commodity taxes

Domestic commodity taxes include:

- (1) Value-added taxes (VAT)
- (2) Export taxes, which include export duties, profits of export monopolies, and imputed taxes on exports resulting from multiple exchange rates
- (3) Sales taxes, such as excise taxes on liquor, gasoline, cigarettes
- (4) Income tax
- (5) Recurrent taxes on land, buildings, and other structures
- (6) Business and professional licenses
- (7) Taxes on the use of fixed assets or other activities
- (8) Stamp taxes
- (9) Taxes on pollution

Information on domestic commodity taxes came from administrative data. These data are collected by several government agencies, such as the Ministry of Finance and the Ministry of Industry, according to economic activity.

3.5.2 Scrap and by-products

In the Thailand Input-Output Table, figures for scrap and by-products are derived through the gross-counting method.

(1) Scrap: This includes metal scrap from the steel industry and rubber scrap from the rubber industry.

(2) By-products: Examples are bitumen (black tar) produced by petroleum refineries and molasses produced by the sugar industry.

Information on scrap and by-products came from administrative data such as those from the Ministry of Industry.

4. CODE CONCORDANCE

For the purpose of compiling the AIO Table 2000, it is important to classify the statistical units for activities and industries in AIO code. The national input-output tables are constructed in different code more specific to the economic structure of Thailand, called TIO code, with the tables set up for 180 major sectors, represented by 7-digit codes. AIO groups it all into 76 sectors, with one-digit codes. The full classification can be found in the annex.

To produce the Asian Input-Output (AIO) Table, with groupings that can be read product by product or industry by industry, the classification of economic activities must be the same as the classification of products. Therefore, the correspondence between AIO and TIO was needed.

The procedure for making concordance to be considered between TIO and AIO classifications are:

- TIO 067 (Spinning): This is disaggregated into AIO code but could be divided into AIO code by rate of control total.
- TIO 067A: This consists of subsectors 100–990 except 150 and 250 .These belong under AIO 018 (Spinning).

- TIO 067B: This sector belongs under AIO 029 (Synthetic Resins). Fiber includes subsector 150 (Synthetic Fiber) and subsector 250 (Synthetic Fiber staple).
- TIO 078 (Sawmills): Divided into 4 sectors: 078A, 078B, 078C, and 078D.
- TIO 078A (Sawmills): This sector belongs under AIO 024 (Timber).
- TIO 078B, 078C, and 078D: These sectors belong under AIO 026 (Other Wood Products).
- TIO 086 (Petrochemical Products): Divided into 3 sectors: 086A, 086B, and 086C.
- TIO 086A (Upstream Production): This sector belongs under AIO 030 (Basic Industrial Chemicals).
- TIO 086B (Intermediate Production): This sector also belongs under AIO 030 (Basic Industrial Chemicals).
- TIO 086C (Downstream Production): Unlike TIO 086A and TIO 086B, this belongs under AIO 029 (Synthetic Resins and Fiber) in order to correspond to the Japanese classification. "Synthetic resins and fiber" includes PP, PS, and PVC; therefore, it does not belong under AIO030 (Basic Industrial chemicals).
- TIO 115 (Special Industrial Machinery): This is disaggregated into AIO code but could be separated into AIO code by rate of control total.
- TIO 115A is classified under AIO 045 (General Machinery).
- TIO 115B belongs under AIO 047 (Specialized machinery).
- TIO 116 (Office and Household Equipment and Machinery) is divided into 2 sectors .
- TIO 116A is classified under AIO 052 (Other Electric and Electronic Products).
- TIO 116B belongs under AIO 050 (Electronic Computing equipment).

5. PRACTICAL PROBLEMS

The main objective of this part is to explain the problem of making procedures for TIO compatible with AIO. The original AIO is compiled to depict the industrial network extended over 10 countries in the Asia-Pacific region: China, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand, and the United States. AIO gives a picture of each domestic industry with its input composition from and output distribution to domestic as well as overseas industries.

The styles of the national tables have to be modified to conform to a uniform format so that they can all fit together with consistent terms. Presented below is the method for adjustment for the compilation of AIO.

The practical problems of TIO with regard to AIO presented are:

- (1) Values for international freight and insurance margins are not separated by commodity in TIO.
 - (2) TIO is not a compilation of import-export matrices by country of origin.
 - (3) For general governmental services, TIO does not count the amount of expenditures for providing those services. AIO defines gross output (CT) as the sum of amount of expenditures for production separately from compensation of employees and depreciation.
 - (4) For imputed interest, TIO should place services in intermediate sectors only.
- Adjusting the national tables makes collecting the necessary data more difficult..

CONTACTS FOR ENQUIRIES

CHINA

STATE INFORMATION CENTRE
No. 58, Sanlihe-lu, Xicheng-qu, Beijing, 100045
China
<http://www.sic.gov.cn/>

Mr. Zhang, Ya-xiong
Assistant Director and Division Chief
Associate Research Fellow
Department of Economic Forecasting
Tel. +86-(0)10-68557129
Fax. +86-(0)10-68558210
Zhangyx@mx.cei.gov.cn

INDONESIA

BADAN PUSAT STATISTIK
Jalan Dr.Sutomo No.6-8, Jakarta, 10710
Indonesia
<http://www.bps.go.id/index.shtml>

Mr. Supriyanto
Director
Directorate of Production Account
Tel. +62-(0)21-3863739
Fax. +62-(0)21-3863739
supriyan@mailhost.bps.go.id

Mr. Budi Cahyono
Chief
Section of National Input-Output
Tel. +62-(0)21-3810291, 3841195 ext. 6132
Fax. ---
boecah@mailhost.bps.go.id

JAPAN

STATISTICAL BUREAU,
MINISTRY OF INTERNAL AFFAIRS
AND COMMUNICATION
19-1 Wakamatsu-cho Shinjuku-ku, Tokyo 162-8668
Japan
<http://www.stat.go.jp>

Statistical Standards Department
Tel. +81-(0)3-5273-2020
Fax. +81-(0)3-5273-1189
ioclass@stat.go.jp

KOREA

THE BANK OF KOREA
110-, 3-Ga, Namdaemun-Ro, Jung-Gu, Seoul
Korea
<http://www.bok.or.kr/index.jsp>

Mr. Kim, Byung Hwa
Director General
Economic Statistics Department
Tel. +82-2-759-4311
Fax. +82-2-759-4449
bhkim@bok.or.kr

Mr. Kim, Chong Gui
Head
Economic Statistics Department,
Input-Output Statistics Team
Tel. +82-2-759-4391
Fax. +82-2-759-4419
chongikim@bok.or.kr

Mr. Lee, Jong Soo
Head
Economic Statistics Department,
Input-Output Team,
Regional I/O Statistics Section
Tel. +82-2-759-4409
Fax. +82-2-759-4419
jnslee@bok.or.kr

Mr. Heo, Sang Do
Economist
Economic Statistics Department,
Input-Output Statistics Team
Tel. +82-2-759-4396
Fax. +82-2-759-4419
hsd3709@bok.or.kr

Mr. Yoon, Yong June
Economist
Economic Statistics Department,
Input-Output Statistics Team
Tel. +82-2-759-4274
Fax. +82-2-759-4419
yyjune@bok.or.kr

MALAYSIA

DEPARTMENT OF STATISTICS, MALAYSIA
Block C6, Federal Government Administrative Centre,
62514 Putrajaya
Malaysia
<http://www.statistics.gov.my/>

Ms. Elias, Omi Kelsom
Director
Economic Indicators Division
Tel. +60-(0)3-8888-9237
Fax. +60-(0)3-8888-9239
omi@stats.gov.my

Mr. Othman, Zainol
Director
National Account Statistics Division
Tel. +60-(0)3-8888-9241
Fax. +60-(0)3-8888-9240
zainol@stats.gov.my

THE PHILIPPINES

NATIONAL STATISTICS OFFICE
4th Floor, Solicare Bldg II, Ramon Magsaysay Blvd,
Sta. Mesa, Manila
Philippines
<http://www.census.gov.ph/>

Ms. Soliven, Julieta P.
Statistician IV
Economic Indices and Indicators Division
Tel. +63-(0)2-7163931, 7153347
Fax. +63-(0)2-7163935
J.Soliven@census.gov.ph

SINGAPORE

BUSINESS RESEARCH CONSULTANTS
78 Bayshore Road
#08-24 Costa Del Sol
Singapore 469991

Ms. Chow, Kit-boey
Director
Tel. +65-(0)6241 9860
Fax. +65-(0)6536 9334
kitbchow@gmail.com

TAIWAN

TAIWAN RESEARCH INSTITUTE
29F, 27, Jungjeng E. RD, SEC.2, Danshuei
Taipei, 251
TAIWAN R.O.C
<http://www.tri.org.tw/>

Ms. Chen, Hung-Chyn
Senior Assistant Research Fellow
Tel. +886-(0)2-8809-5688 ext 229
Fax. +886-(0)2-8809-5257, 8809-5066
229@tri.org.tw

THAILAND

THE NATIONAL ECONOMIC AND
SOCIAL DEVELOPMENT BOARD
962 Krung-kasame Road,
Promprab, Bangkok 10100
Thailand
<http://www.nesdb.go.th/>

Ms. Prapasri, Pongwattana
Director
Input-output section
Department of National Account
Tel. +66-(0)2-280-4085 (ext. 6190)
Fax. +66-(0)2-281-5241
prapasri@nesdb.go.th

U.S.A.

BUREAU OF ECONOMIC ANALYSIS (BE-51)
U.S. Department of Commerce
1441 L Street, NW
Washington. DC 20230
U.S.A.
<http://www.bea.gov/beahome.html>

Mr. Planting, Mark
Chief
Industry Benchmark Division
Tel. + 202-606-9537
Fax. ---
Mark.planting@bea.gov